FACTORY

MANAGEMENT AND MAINTENANCE

DECEMBER 1948

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"We have found Plug-In Strip to be all you claim for its ease of installation on the job, the saving of labor, the complete service it renders and the economy as compared to individual outlets."

Electrical Contractor

"Plug-In Strip lends itself to a multiplicity of applications, and we now have not only electrical contractors, but also department stores and industrial accounts using this type of convenience outlet system."

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"Your new Plug-In Strip with its cut-in-the-field feature and fast method of connection is a big improvement."

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"Especially in renovating, we found that Plug-In Strip installed very smoothly, eliminating considerable amount of breaking into the structures . . . We are proud of our installations, have made profitable jobs, and lastly our electricians like to work with it."

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"We have found that there is no waste, and Plug-In Strip was very easy to install."

Electrical Contractor

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Electrical Contractor

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NAME.....

ADDRESS.....

.....

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PRODUCTS CORPORATION

FACTORY

MANAGEMENT and MAINTENANCE

DECEMBER, 1948

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"Give us the tools . . ."

For High Wages, Full Employment . . . Business Must Have Better Tools *and More Money to Pay for Them*

So far we have escaped the post-war depression predicted by leading government economists. How can we continue to frustrate gloomy prophets who see only depression ahead?

At the end of World War II the federal Director of Reconversion saw depression immediately ahead. He said we would have 6,000,000 unemployed four months after VJ-Day and 8,000,000 a few months later.

But we did not have depression. We did not because:

First, the American business man, sensing the obligations of a vastly more important post-war America, went ahead to build his plant and equipment to meet expanding domestic and world markets—markets bigger actually and potentially, in terms of world-wide trade and profits than any previously envisaged.

Second, the American businessman was able to get the money to go ahead. Since 1945 he has spent $50 billion building new plants and buying new equipment.

There may be other reasons why we missed a depression in 1946. But—make no mistake about it—what has powered our present prosperity is the $50 billion spent by businessmen since VJ-Day to improve their plants.

It provided jobs directly for 5 million people. It paid for more than half of our record-breaking steel output. It put in place the foundations of great new industries such as television. It strengthened the foundations of the chemical, machinery, plastics, steel and oil industries. It has expanded and improved our power systems throughout the country.

This spending has made the difference between prosperity and slump, between industrial strength and serious deterioration.

In fact, we know now that what business spends for new plants and new tools always makes the difference between prosperity and slump, the difference between national strength and weakness.

The accompanying chart tells the story. When we have spent heavily for new plants and equipment, we have had prosperity and strength. When we have not, we have been in trouble.

We would have been in trouble since VJ-Day except that business used its war reserves, plus two-thirds of its profits, plus borrowed money to improve and expand its facilities. This year industry is spending $19 billion this way.

Has this great post-war expansion actually made our economy a "mature economy"? Have we come now to the saturation point the New Dealers mistakenly said we had reached in the '30's?

The answer is no!

Proof of that answer is being developed through a McGraw-Hill national survey of "Business' Needs for New Plants and Equip-

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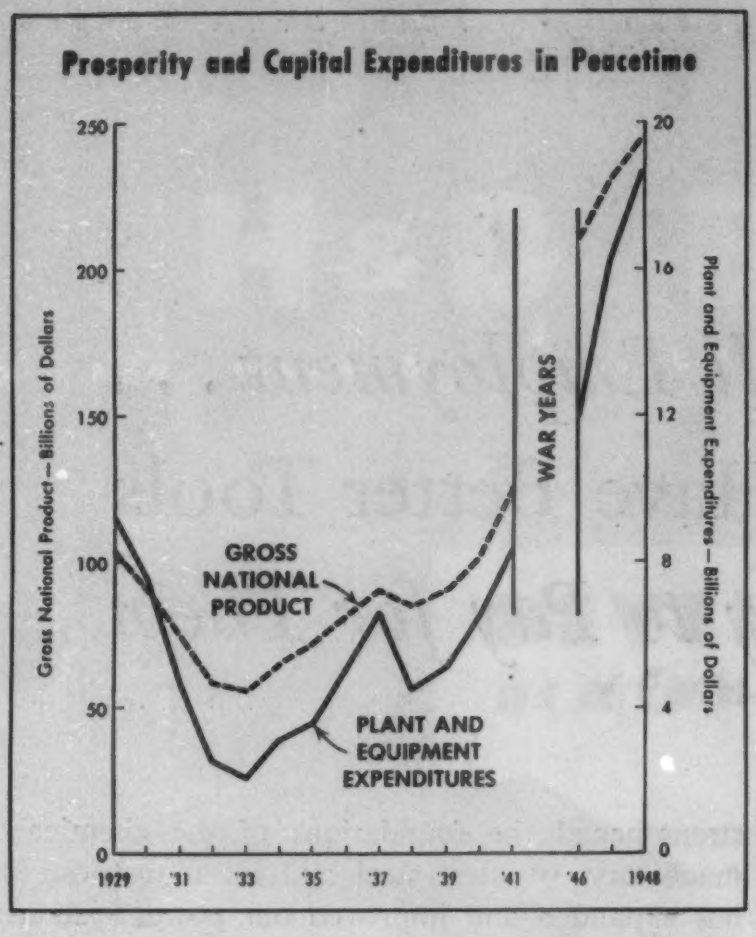

ment" details of which will be given in this editorial series in coming months.

We have a bigger nation, more people, to serve right here at home. Further we must meet human needs which the war created around the world. Also, we must sustain a world position such as this country never assumed before.

Here are immediate things crying to be done.

1. Business still needs billions to expand production because our country and our needs are growing rapidly. Example: To meet the demand for power, electric utility companies must nearly double their present generating capacity in 10 years. That will cost more than $7.5 billion. To fill increasing needs for oil and gasoline, oil companies must spend at least as much.

2. Business still needs billions to get its plants up to date and overcome wear and tear. Examples: Over half a million of our freight cars, a third of the total, are more than a quarter of a century old. About two-thirds of the looms in the textile industry are more than 20 years old. Half of our coke ovens, basic equipment for iron and steel production, are more than 20 years old, and only half as efficient as modern ovens.

3. Business still needs many billions to do new things in dramatic new ways. Example: Machinery that will cut out 80% of the dirty, dangerous work of mining soft coal has been perfected. A new automobile engine plant will reduce the work that goes into engine-building by three-quarters.

Hundreds of similar things that our scientists and engineers have developed could be cited. They can be found in every industry. They hold immeasurable promise of adding to the abundance of American living. In fact, there is hardly a step along the whole route of industry—from roughing out raw materials to delivering finished goods—where there are not new and better ways of doing things standing ready for general use.

But the crucial question now is: Where is the money coming from to put to work these new and better ways of doing things?

Business has used its own resources so far... profits and reserves. The stock market, where industry traditionally has raised money from people willing to risk their savings, has been limping along, giving business no chance to get enough money on satisfactory terms. *Business now must look primarily to its own earnings for the money to carry out the improvements which are necessary if America is to keep itself strong and efficient.* The next editorial in this series will deal with this new and crucially-important role of profits.

But business can not count on profits alone to do the job. Profits are too uncertain.

From now on finding the money... to put new ideas and new equipment to work... to go ahead with the expansion and improvement that will thwart depression and build industrial strength ... *calls for the support of all Americans everywhere.*

This comes right down to *you... for at stake is your chance for steady work, for better pay, for new things like television, and for more of the every-day things, like coal and clothing, of better quality and at less cost.*

By helping business get new and better tools, you will help yourself—and you will help build a more sound, more prosperous, better America.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

FACTORY
MANAGEMENT AND MAINTENANCE
L. C. MORROW, EDITOR

PLANT OPERATION FOR 1949

DECEMBER is stock-taking time. Looking ahead is the order of the month. In the field of plant operation, it is appropriate for management to re-state objectives, and to re-examine ways and means of attaining them.

To achieve lower production costs is, of course, the over-all objective. Lower production costs are imperative in meeting competition and in widening markets. They act to lower selling prices, raise standard of living, and increase demand for industry's products.

There are other objectives that go along with the objective of lower costs: Good management-worker relationships. Good standing in the community. The right quality of product.

The ways and means of reaching these objectives—ways and means that constitute management's tools—are three: Equipment, methods, and people.

In any period of rising labor and materials costs, technological development goes forward rapidly. It is doing so now. So, in looking ahead toward lower production costs, the probability that more productive equipment is available must not be overlooked. Service equipment, too, is being improved and offers opportunities for cost-cutting. The possibilities in better handling are cited as an example.

As to methods, there is no end to improvement. Always the revised method can itself be revised. And if the term "methods" is stretched to include procedures, the possibilities really are unlimited. There opens up the whole range of improvements to be made by the right kinds of planning and control, as well as the betterments to be brought about by the manufacturing methods themselves.

People must use the equipment and follow the methods and procedures or the objectives cannot be attained. They can do so enthusiastically, half-heartedly, or reluctantly. How they do so is, in the long run, the responsibility of the men who have to make a go of plant operation. There is a long string of devices that can be used to induce the people of the plant to contribute toward bringing about lower production costs. They can be summarized as workplaces, work methods, and pay methods. They run the gamut from plant buildings through security items, through suggestion systems, through methods improvement, through incentives.

Why "People" Are So Important

In the year ahead labor costs will go up—probably not as fast as heretofore, but still up. There is little doubt of a fourth round. Moreover, there will be no noticeable slack in the labor force. We shall continue to have full employment so that there will be no bidding for jobs on the part of labor. On top of that, the effect of the presidential campaign upon the thinking of workers and the public will have to be overcome. The loose statements about employers were bound to make some workers suspicious of employer motives and actions. The ground that has been lost will have to be recovered.

So it is a worth-while procedure when plant operating executives look ahead at the end of the year to see what better job can be done, and to figure out how to do it.

L. C. Morrow

"How much are Johns-Manville's taxes? $1 MILLION? $5 MILLION? $8 MILLION?"
1
Last year J-M's total ta
$8 million or 6 ½ ce
sales. That's more th
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to pay $443 fo
UNITED STATES
CANADA
2
A large part of the tax bill was for U. S. and
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to more than $900,
the ben
PRICES
PROFITS
WAGES
and your chances
to work
reprinted from LIBERTY magazine
October, 1947
THE
FREE ENTERPRISE
SYSTEM
What It Is - How It Works
What It Has Done
by
PHELPS ADAMS
Chief of The Sun's
Washington Bureau
Reprinted from
The Sun
NEW YORK
The Story of PRICES
And How They
REW

Successful Community Relations in Eight Companies

Fundamental goals and principles vary little, the methods widely. This is the way the facts point in a FACTORY study of successful community relations programs in eight American companies. To a number of the problems management faces in this field, the symposium below presents effective answers

---

JOHNS-MANVILLE CORPORATION

. . . has a coordinated plan flexible enough for individual plant use

JOHNS-MANVILLE CORPORATION, with 20 widely scattered plants, offers an example of how a large company coordinates a community relations program, yet leaves it flexible enough to handle varied local problems.

The company's over-all objectives are four:

1. To cultivate an informed public opinion about J-M.

2. To acquaint thought leaders with the basic economic factors enabling the company to provide jobs, pay taxes, furnish needed products and services, earn a reasonable profit.

3. To demonstrate, through favorable actions by J-M, the importance of the free enterprise system.

4. To stimulate the public to seek jobs at J-M, buy its products, invest in its securities.

To attain these objectives, public relations policies and methods, as developed by top-level management and the public relations department in New York, have been set down in a manual, "J-M's External Relations." It tells what the company plans to do, and why.

With the philosophy of the program made plain, plant managers—primarily operating men—can handle their local problems more adeptly. The public relations department at J-M headquarters advises on the answer to the occasional tough question that crops up. Basically, however, the company policy is to let the manager on the spot run his own show.

JOHNS-MANVILLE uses advertisements and booklets like these to tell company's story

A typical instance of the way the public relations department in New York dovetails its activities with those of the local plant manager may be seen in the matter of mailing printed material. Here's how it works:

1. If the material is of company-wide or national interest, it is distributed by the office of the chairman of the board.

2. If a local signature is advisable, the plant manager, or the assistant to the vice-president for production, is called upon, and letters are sent out over one of these names.

3. If the material can be distributed "more effectively or judiciously" by an outside organization, the latter is employed. But such instances have been exceedingly rare.

Material for local distribution is shipped in bulk to plants, complete with addressed envelopes, insertions, or letters. Spared the bother and responsibility of assembling these mailing pieces, the manager has only to get them to the post office.

Local mailing lists aim to include influential people in 13 groups. Material is sent to them at 2-week intervals. Monthly public relations reports, in which managers sum up the local situation for headquarters, provide space for additions and deletions to the list of people it is desired to reach.

Much the same care has been taken in planning press relations, plant visits, and advertising. After outlining the benefits that can accrue, the company policy, and the "how" of handling, say, plant visitations, managers are told:

"Experience shows that visitors want *four* things—

"1. A broad view of the plant, its people, its operations, its products.

"2. A chance to meet the men of industry and hear their points of view.

"3. An opportunity to exchange views with the industrial leaders in the community.

"4. An explanation, in terms related to each visitor's own pocketbook, of how J-M operations affect the local economy."

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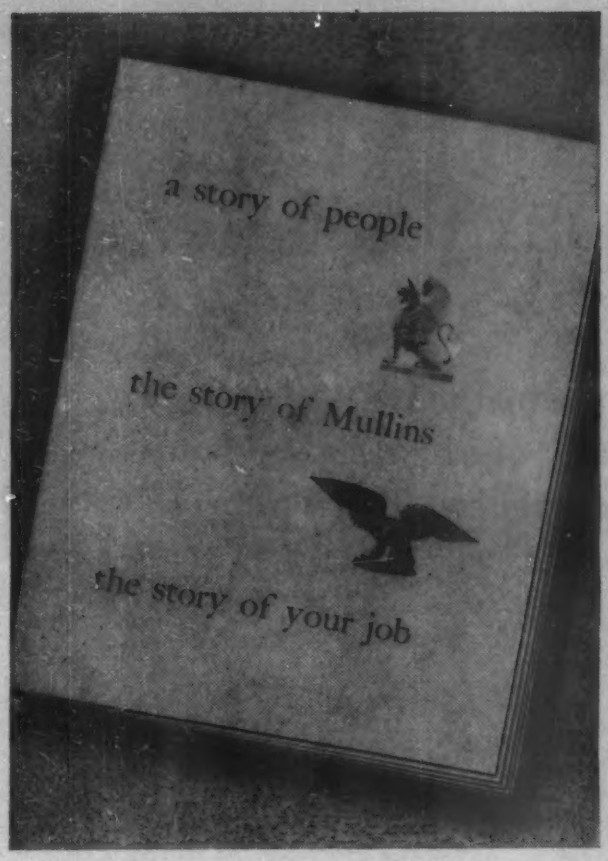
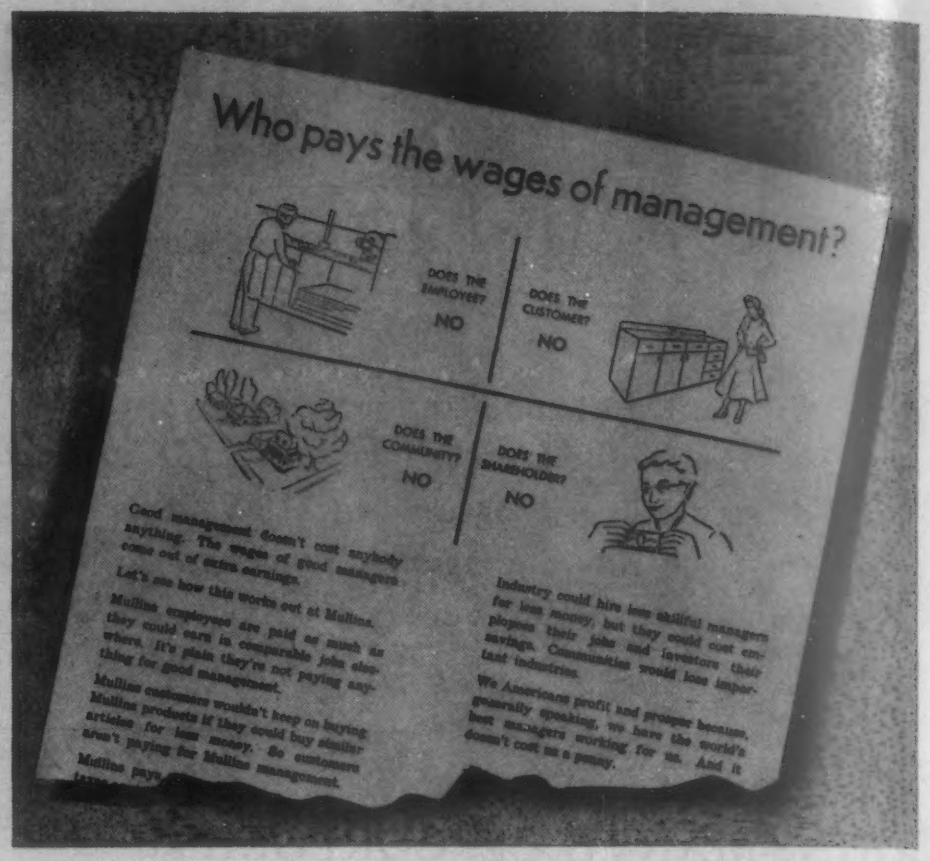



Who pays the wages of management?
DOES THE EMPLOYEE? NO
DOES THE CUSTOMER? NO
DOES THE COMMUNITY? NO
DOES THE SHAREHOLDER? NO
Good management doesn't cost anybody anything. The wages of good managers come out of extra earnings.
Let's see how this works out at Mullins.
Mullins employees are paid as much as they could earn in comparable jobs elsewhere. It's plain they're not paying anything for good management.
Mullins customers wouldn't keep on buying Mullins products if they could buy similar articles for less money. So customers aren't paying for Mullins management.
Industry could hire less skilful managers for less money, but they could cost employees their jobs and investors their savings. Communities would lose important industries.
We Americans profit and prosper because, generally speaking, we have the world's best managers working for us. And it doesn't cost us a penny.

HANDSOME BOOKLET marking Mullins's 75th year in business was widely distributed in plant cities. Advertisement at right was on series explaining functions of American economic system

MULLINS MANUFACTURING CORPORATION

. . . plans its community relations activities to match a four-point program

A FOUR-PLANK PLATFORM guides the community relations program at Mullins Manufacturing Company. No activity in this field is undertaken unless it emphasizes one or more of the following points:

1. The American system of living and doing business is better than any other and is worth defending against its enemies.

2. Mullins, as part of the American system, is a credit to its communities (Warren and Salem, Ohio), is a good place to work, is building for the future.

3. Mullins must make a fair profit or fold up.

4. To benefit most, employees must give an honest day's work, plus loyalty; they must accept some promises on faith until there has been time to deliver.

Moreover, the company takes pains to mesh an elaborate industrial relations program in with the external relations plan. For instance, when an idea has been adopted and is ready for use, care is taken to inform "middle management" and foremen—and through them, all employees—not only *what* is ahead, and *when*—but *why* it is being done.

Several media are used:

Radio. A Sunday afternoon local program, "American Opportunity," has been a popular show. Half music, half dialogue, it tells the stories of eminent Americans who took advantage of the opportunities that exist only in this country.

Publicity and advertising. Nationally, advertising is almost entirely consumer type; locally, the reverse is the general rule.

Printed booklets. Through the Industrial Information Institute, an association of 83 companies in the Youngstown-Sharon-Niles-Warren-Salem district, Mullins gets additional community relations help. Often it is good counsel; but it takes more tangible form, too. For example, a 16-page color-continuity comic book, telling the American economic story, is being prepared, and thousands of copies will go to school children in the company's two areas.

Here's how Mullins worked on one problem:

The company decided that the time had come to sum up many of the statements it had been making for the past six or seven years, and show it hadn't merely been talking. The resulting program:

1. Told in a series of local newspaper advertisements the facts about Mullins, what its future plans were, its profits, management, and "the American story," in contrast to the Communist principle.

2. Repeated the story in the form of a film, "Crossroads for America," before church groups, American Legion members, businessmen's organizations.

3. Organized a speakers' bureau of executives and other employees to go before various local groups. In 60 days, 40 appearances were made.

4. Drove home the program in Mullins plants.

5. Invited members of the community to open houses and plant visits. As host, the company was able to go over the highlights of the story once again.

In a period of 100 days, the company reports, it reached thousands of people. The spot program paid off and accomplished its purpose.

LOCAL ADVERTISEMENTS have driven home Caterpillar's story, and simultaneously explained some basic industry economics to the people of Peoria

CATERPILLAR TRACTOR CO.

. . . tells its story to the neighbors and does things for them, too. Results —excellent

ONE OF THE UNUSUAL FEATURES of the community relations program at Caterpillar Tractor Company, Peoria, Ill., is the fact that the plant has no director of public relations and no public relations department.

Instead this function is handled through what the company calls the conference system. All departments may be drawn into the program, individually or together, as the situation warrants. However, certain daily tasks are performed by two groups—the training and community relations department, and the news service, which is a part of the general sales department.

The showing of movies, community advertising, evaluating requests for cash donations, and delivering talks before clubs and other groups, are conducted by the first department. The second handles press and radio relations, and also serves as a clearinghouse for news releases and general information from all divisions of the company.

Former editors and newspapermen predominate in the news service staff; personnel skilled in public speaking, and who know the community thoroughly, make up the community relations department.

Since Caterpillar is easily the largest enterprise in Peoria, it is natural that many of its employees should be named to posts in a variety of local organizations. Moreover, this is encouraged by management.

"It is the company's desire," states a directive from the president, "that employees handle their share of these duties and in every possible way demonstrate our wish to be good members of the community."

To that end, employees engaged in civic affairs are given time off during the working day (within reason), in order to fulfill their obligations.

Caterpillar's policy of working with the community often takes form in substantial—even spectacular—projects. For example, company officials worked closely with the flood committee of the Peoria Association of Commerce to eliminate a flood hazard that periodically caused thousands of dollars' damage. When East Peoria's reservoir was dangerously low during a recent dry spell, Caterpillar came to the rescue with a million gallons of water per day from its own wells.

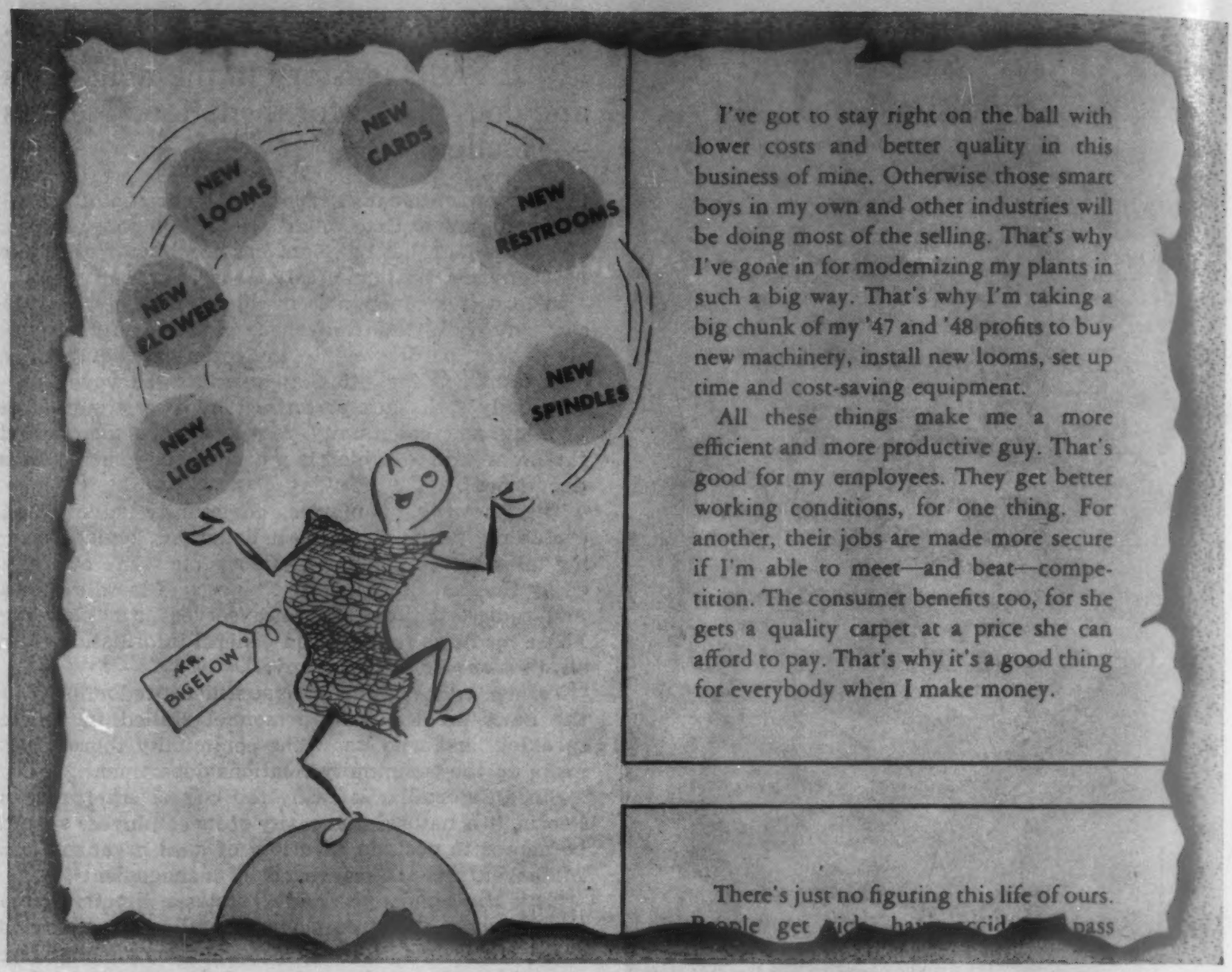
Again, when a community recreational area was started, it was the company's equipment and manpower—donated for the job—that helped move 250,000 cubic yards of dirt in 48 hours.

Worthy causes, such as improving hospital facilities in Peoria, are supported by substantial donations, and the company tries to set the example in this field for other local enterprises.

Surveys are occasionally made to see how the program is getting along. Caterpillar officials state that both the 1944 and 1946 polls indicated that the company was well regarded in the area. People thought it was a good place to work, took care of its responsibilities to employees and the community.

But, the surveys showed, they also thought the firm's profits were pretty high, and they would welcome more frequent opportunities to visit the plant.

Advertisements in Peoria newspapers have been



I've got to stay right on the ball with lower costs and better quality in this business of mine. Otherwise those smart boys in my own and other industries will be doing most of the selling. That's why I've gone in for modernizing my plants in such a big way. That's why I'm taking a big chunk of my '47 and '48 profits to buy new machinery, install new looms, set up time and cost-saving equipment.

All these things make me a more efficient and more productive guy. That's good for my employees. They get better working conditions, for one thing. For another, their jobs are made more secure if I'm able to meet—and beat—competition. The consumer benefits too, for she gets a quality carpet at a price she can afford to pay. That's why it's a good thing for everybody when I make money.

There's just no figuring this life of ours. People get rich, have accidents, pass

CHEERY FIGURE of "Mr. Bigelow" added warmth and personality to company's annual report. Statistics of this type also appeared in local newspapers and, being readily understood, fostered closer relations

used to correct the profits misconception; and plant visits and open houses have helped, too.

Because the surveys also reflected the community's dissatisfaction with housing and traffic conditions, Caterpillar officials sold proving-ground land for a large housing project. And with other companies and governmental bodies it donated funds for more traffic lights and paving. Employees are now working with civic groups on a plan for a new bridge which will eliminate a major traffic snarl.

Since 1943 Caterpillar has organized and supported discussion groups. These groups meet regularly and exchange views on many subjects. They include spokesmen from the clergy, labor, civic groups, and just plain citizens. The usual form is a dinner or luncheon meeting at which a 10-min. paper is delivered. An hour of discussion follows. These groups are not action groups at all. They are gathered together for one purpose only—to get better acquainted.

Other community leaders are reached at regular intervals with the Caterpillar house organ, the annual report, and similar material. Local merchants cooperate in arranging window displays featuring the company's products and people; and not long ago a portable exhibit of paintings used for the preparation of national advertising traveled all over the Middle West and attracted favorable attention.

BIGELOW-SANFORD CARPET COMPANY, INC.

. . . holds that good public relations are essential to the continued success of any company

FIRST JOB at Bigelow-Sanford Carpet Company is to be a good neighbor. So runs a recent directive from top management to foremen.

This emphasis on community relations dates back to the time the new president took office, shortly after the close of World War II. The firm was acutely short of labor—and was shooting for high production goals. Therefore, despite the considerable costs involved, an intensified program was launched, and after three years of activity, Bigelow-Sanford management is satisfied with the results.

Realizing the importance of successful community relations, the president of the company devotes a considerable part of his time to the problem. And the director of public relations is at the policy-making level. The company's operating committee studies this function along with the more usual agenda of finance, manufacturing, and so on. A New York

public relations firm works closely with top executives in an advisory capacity.

While industrial relations is given due weight in the over-all plan, Bigelow-Sanford found by survey that plant communities deserved immediate attention, and the emphasis in the program, if it is anywhere, lies in this department.

This function is handled by a community relations manager for the three plants in Amsterdam, N. Y., Thompsonville, Conn., and Bristol, Va. He also is responsible for the company house organ, and liaison with the industrial relations department.

A press relations manager handles press and radio relations, publicity, stockholder, dealer, and consumer relations. Assisting him in the last field is the home service bureau, headed by a well-known decorator. She also writes and lectures for consumer audiences.

Each plant manager has a public relations assistant. The latter has been trained in the field either by prior experience or in sessions with the department at New York headquarters, and is given a fairly broad field of action—within the framework of top management policy. He is, of course, responsible to the plant manager for all he does, or fails to do.

In contrast to policy at Johns-Manville, all material sent to community leaders is mailed locally. While most advertisements are developed in New York, the local public relations assistant can, on occasion, make up his own copy for local media.

At all three plants, open houses and plant visits are standard practice, but the company thinks plant visits are more useful than open houses.

"We have found," a company spokesman explains, "that where you have a group with like interests—whether they're school children, ministers, bankers, or what have you—we can emphasize the phases of operation most interesting to them. They get the part of the story they most want to learn. Whereas, in an open house, you touch on everything and have to omit details that one part or another of the group would like to hear."

Participation of employees in community affairs is encouraged. In addition, executives find time to deliver talks and take part themselves. Slide films and movies also are sponsored and have proved to be a popular feature of the community program.

Within the short period of three years, there has already been substantial progress, company officials say. And they are hopeful of even more progress in the years ahead.

BRIDGEPORT BRASS CO.

. . . counts its very cordial relationships with 5000 workers as the program's greatest asset

BY VARYING the standard formula, Bridgeport Brass Company has come up with a successful community relations program. That is, the company does not mail material to community leaders; it maintains no speakers' bureau; it sponsors no round-table discussions; and, aside from technical groups, the public is shown through the Bridgeport (Conn.) plant only infrequently. And these policies work.

The mainspring of the company's success is the close and cordial relationship between the management and the 5323 employees. Not since the firm was established in 1865 has there been a strike or slowdown. It's a hard record to match.

Bridgeport Brass takes special pains to keep its workers informed, then lets employees follow their natural bent and tell the company's story. By this means, about 25,000 people in the city are influenced to think well of the company, year in and year out.

To be sure, this is not the whole of the public relations program; but it forms an important part of it. As the public relations director sums it up:

"We simply tell our own employees first and the community second about the things we stand for—the things we believe in—and the things we are doing, and the things we are going to do."

This is accomplished:

1. By mailing the annual report, the *Bridgeport Brass News*, and other material to the home of every worker. Such information is well received.

2. Through a President's Letter, which is issued at about 6-week intervals. In these letters the chief executive discusses company affairs in great detail. Which way business is going, prices and profits, why certain men are being laid off, are among subjects recently treated. Surveys show that the vast majority of employees like these frank letters, feel well informed about company activities—and so are in a position to spread not only the good word but also the accurate word throughout this area of the state.

3. By supplementing employee public relations work with a series of institutional advertisements in Bridgeport Sunday newspapers. For example, the 1947 survey indicated that many people in the community were not sure what products the company made. Picture-story advertisements have helped fill in this gap, and have earned favorable comment.

4. By helping to increase the community's recreational facilities. Perhaps the outstanding instance of leadership in the field occurred in 1946, when the company advanced $56,000 to refurbish (and partly rebuild) a condemned armory. Converted to a sports and community center, it has since been used by Bridgeport high school and college students, for civic meetings, and similar functions. Some income is derived from the center; it goes to maintain and improve other recreational facilities.

Because operations at the company's plants do not lend themselves to open-house parties and visitations, only technical groups are regularly taken on conducted tours. But the company believes a pretty fair substitute has been found in a 16-mm. movie, in sound and color. This is shown free to schools, service clubs, and other groups, and is believed to reveal the operations of the company more completely than could be demonstrated in an actual visit.

The Bridgeport Manufacturers Association and the Bridgeport Chamber of Commerce also are active in the community relations field, and, in telling industry's story—in local terms—they directly and indirectly benefit the company's own efforts.

A word of explanation as to why Bridgeport Brass does not maintain a list of community leaders is in order. The company tried the idea and it backfired. Annual reports, company letters, and other material were, in a community with strong leftist elements in it, several times distorted and used against the company. So the practice was stopped.

CONTINUED ON NEXT PAGE

HERE ARE THE FACTS about the Threatened Servel Strike

Servel is faced with the threat of a strike. The Company's employees have been kept fully informed regarding the issues at stake. But, because almost everyone in Evansville will be affected by any serious interruption of work at Servel, the facts are presented here for the information of the community as a whole.

A contract between Servel and UE-

• Servel wages are already the highest paid by any metal working plant in Evansville—more than 10% higher than the average of ten representative metal working plants in Evans-

would have provided the same "wage reopening" clause under which the wage increase of 1947 was negotiated.

• The Union rejected the second proposal, too. Later the offer was renewed by the Company with the additional provision that any agreements already reached by the Company and the Union be made a part of the extended contract. This meant that all the clauses thus far agreed upon—more than half of those under consideration—would be incorporated immediately in the contract.

5 On March 17, 1948, the Company

FACED WITH STRIKE, Servel kept the community and its employees informed of every move in the management-labor dispute in series of advertisements. Under the barrage of facts, union finally backed down

SERVEL, INCORPORATED

. . . sound public relations in past years paid dividends to the company when the pinch came

SINCE THE WAR ENDED, few companies have had their community relations program subjected to a more severe test than Servel, Inc., Evansville, Ind.

Fortunately, Servel was not unprepared. Its record in both industrial and public relations had been good; and in both fields, since 1946, the management's efforts had been intensified.

The company also was aided by the long-term public relations program sponsored by the Evansville Manufacturers and Employers Association. A venerable organization, it received a new lease on life in 1937 when Servel's president led the way in reorganizing it, and in finding the money and talent to make it effective.

Today, with 33 member-companies, EMEA can look back on more than ten years of telling the Evansville area about its local industries—and about the broader economic facts of life.

Meanwhile, Servel's industrial and community relations program has been progressing steadily. A variety of media are used—newspaper and magazine advertising, newspaper publicity, radio, direct mail to community leaders.

Then came the test. Early this year, Servel became embroiled with Communist-dominated Local 813, United Electrical Workers-CIO, the largest and most powerful union in Evansville. (For more information about this leftist union, see FACTORY, November, 1948, pages 66-69.)

Faced with a strike threat that might be carried out at any time, Servel shelved the general public relations campaign and developed an emergency plan.

Its tone and attitude were set by the first announcement to employees, which also was published in the local newspapers:

"Your company," the introduction read, "knows that, when you understand all the facts about any matter, you will reach sound conclusions. But if you are uninformed or receive misinformation, you can't be blamed for reaching wrong conclusions. For that reason, your management will keep you informed about the company's relations with the UE-CIO."

Servel was as good as its word. Not only were employees kept informed—by bulletins mailed first-class to their homes, plant bulletin boards, and so on—but the Evansville community also was kept up to date with newspaper advertisements and front-page stories.

For three weeks, the company poured on the facts. Its position on the most controversial issue—wages—was made perfectly clear: The union's proposed increase would cost 250 per cent of Servel's 1947 profits, and thus was obviously unreasonable.

Despite considerable name-calling and groundless accusations made by leftist leaders, the company's bulletins and advertisements retained their original straightforwardness; the facts spoke for themselves and Servel wisely left well enough alone.

By March 25 the siege was over. In Bulletin No. 7, management was able to say:

"The new agreement . . . provides for extension of the old contract for one year."

Several changes of a minor nature were made—and that was all. Servel had won its case before the public, and before its employees, despite the bitter opposition of Evansville's most militant labor union.

Evansville Manufacturers and Employers Association took no part in this war of words and ideas. That its public relations work helped create sympathy and understanding in Evansville before the test began is the view of many of local observers. Management at Servel agrees.

THE TIMKEN ROLLER BEARING COMPANY

. . . comprehensive program covers six plant communities; radio plays an important role

ONE OF THE MOST comprehensive community relations programs studied was that of The Timken Roller Bearing Company, Canton, Ohio. Here is the way the problem is handled in six plant cities:

1. *Advertising.* Biweekly half-pages keep employees and members of the community informed on company labor policy, programs for the handicapped, progress of the suggestion system, product information, and similar matters. On occasion, this space is devoted to stating the Timken view on a labor dispute, a local issue, or a community drive.

2. *Public meetings.* Each year, executives meet with approximately 600 leaders of public opinion in plant cities, and after reporting on the company, answer all questions pertaining to Timken asked by the audience. Occasional meetings are held with parts of the same group, to present distinguished out-of-town speakers.

3. *Mailing.* Approximately 5000 leaders in plant cities receive Timken literature each week, covering such matters as Communism, talks by company officials, and so on.

4. *Radio.* Timken sponsors four programs—a daily half-hour of recorded music; a weekly hour of classical and semi-classical music, and a talk on the "State of the Company" by an executive; a daily sportscast (in Canton only) with the commercial time donated to public affairs; and, five nights a week, a noted radio commentator, with the commercial time again given over to civic or national affairs. In addition to these scheduled programs, Timken buys time to publicize special events of local interest, such as football games, a visit by the Freedom Train, and so on.

5. *Open house.* Twice a year, Timken invites the general public, employees, and their families to come and visit during open house week. Refreshments and transportation are furnished. Other special groups—students, women's groups, businessmen's associations—are taken on plant tours throughout the year.

Timken also performs public services in the various communities where its plants are located, thereby enhancing its reputation. For example, after the war ended, the company offered iron lungs to all accredited hospitals in the six "branch" cities. These, it was explained, were a memorial to employees killed in the war.

Continuing work in this field, Timken developed and put into practice a program for aiding handicapped ex-servicemen. Simultaneously, a veterans' center, under company sponsorship, began helping with the twin problems of reemployment and rehabilitation. When the center finally closed last year, several thousand men had made use of the service.

Paralleling this thorough job in community relations, Timken takes pains to ensure that its 19,000 employees are kept abreast of company news, and hence, indirectly, can participate in cementing relations in plant cities. Five types of material are distributed in this information-sharing program:

1. *The Timken Trading Post*, employee magazine, goes to all workers, and also to 1500 professional men's waiting rooms in company cities.

2. Product mailing cards, in full color, show employees how and where Timken products find their applications.

3. Reprints of radio talks and reproductions of biweekly advertisements make it easy to keep up with current management thought.

4. Special booklets, treating a variety of subjects at some length, are issued periodically.

5. Cards and circulars to inform employees on spot-news events (labor law decisions, for instance) also are used.

THE AMERICAN GREETING PUBLISHERS, INC.

. . . a tough problem followed mushroom growth; an intelligent program has helped to solve it

AMERICAN GREETING PUBLISHERS, INC., has been established in Cleveland for more than 40 years. Its growth was gradual; by the time World War II ended, 350 workers were employed.

Then, in less than two years, it quadrupled its staff, mushroomed from a tidy midwest concern into a leader in its field, with offices in all 48 states and in Asia, Africa, and Australia.

Meanwhile its employee and community relations took a sharp nosedive. The director of public relations recalls that in 1946 it was not uncommon to hear in some circles such remarks as "it's a compliment to be fired by American Greetings," or "what do you do at American Greetings—write verses?"

The company's management, on the other hand, was convinced it had the right attitude; the community was getting only one side of the story. A community relations program was therefore begun with these objectives:

1. Employees must feel happy and secure in their jobs, thereby reducing costly labor turnover.

2. The company must sell itself to the community as a good neighbor, and as a good place to work.

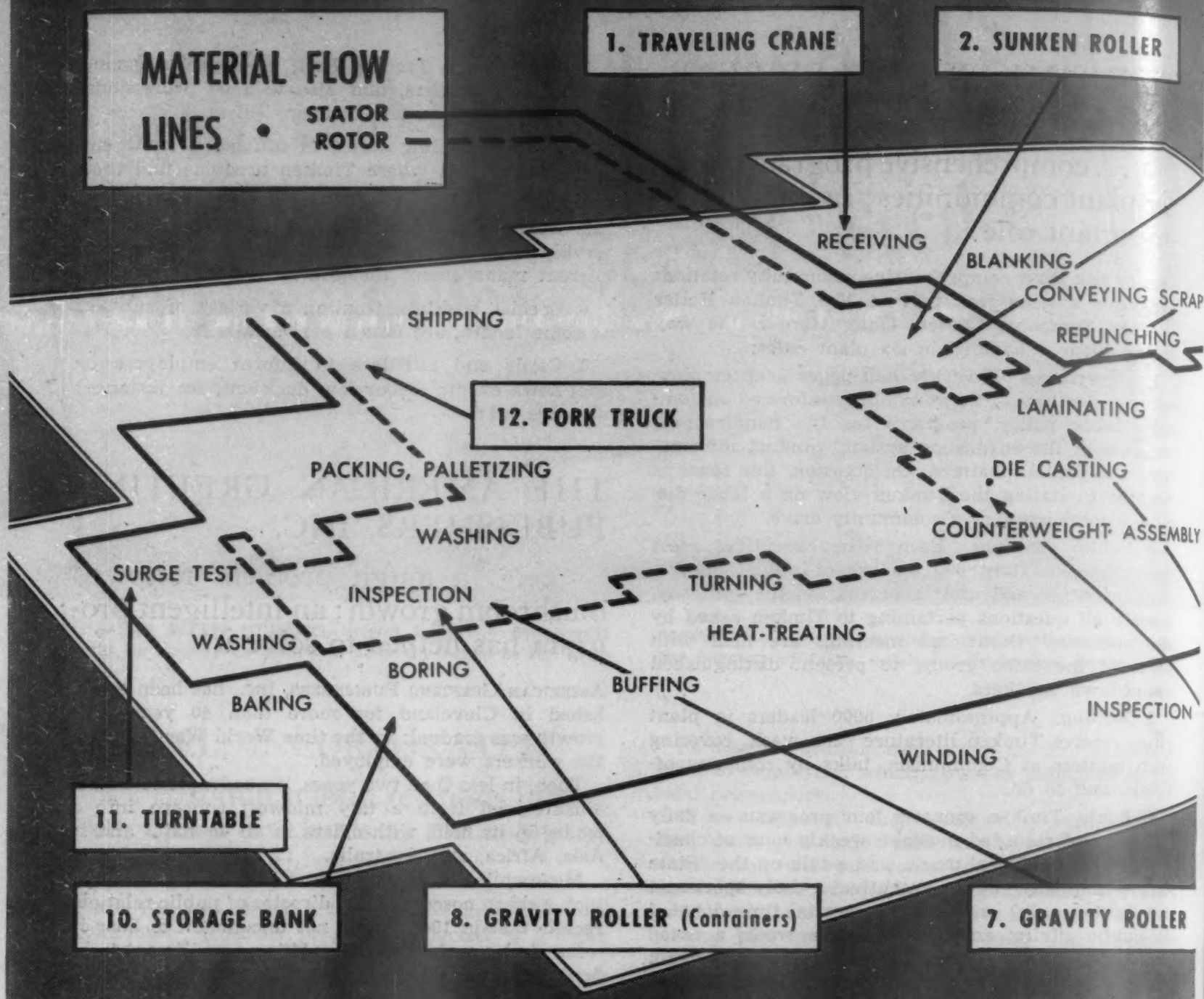
3. Customers must know American Greetings as a producer of well-serviced, reliable products.

4. Customer good will must be extended nationally.

After getting the industrial relations program well launched, the company worked intensively on the community relations phase of the plan.

Mailing lists were compiled; executives and employees were encouraged to take part in clubs and civic affairs; plant visits and open houses were organized; a film about the plant was produced, without outside help; and the press and radio were furnished facts about the firm. The improvement was marked.

Customer good will has recently received attention. An external publication with a circulation of 40,000 has just passed its second edition. Issues are divided 75-25 between good merchandising practices, and what the public relations department describes as "direct company bragging."



STATOR AND ROTOR LINES AT GE'S TIFFIN, OHIO, PLANT FOLLOW SAME COURSE AND USE COMMON HANDLING FACILITIES THROUGH FIRST

MECHANIZED HANDLING BRINGS TWO-WEEK INVENTORY TURNOVER

GEORGE W. AUER • PLANT MANAGER, GENERAL ELECTRIC COMPANY, TIFFIN, OHIO

COMPLETE MECHANIZATION of materials handling, combined with good layout, has produced three important results at the new Tiffin, Ohio, plant of General Electric Company. These results are:

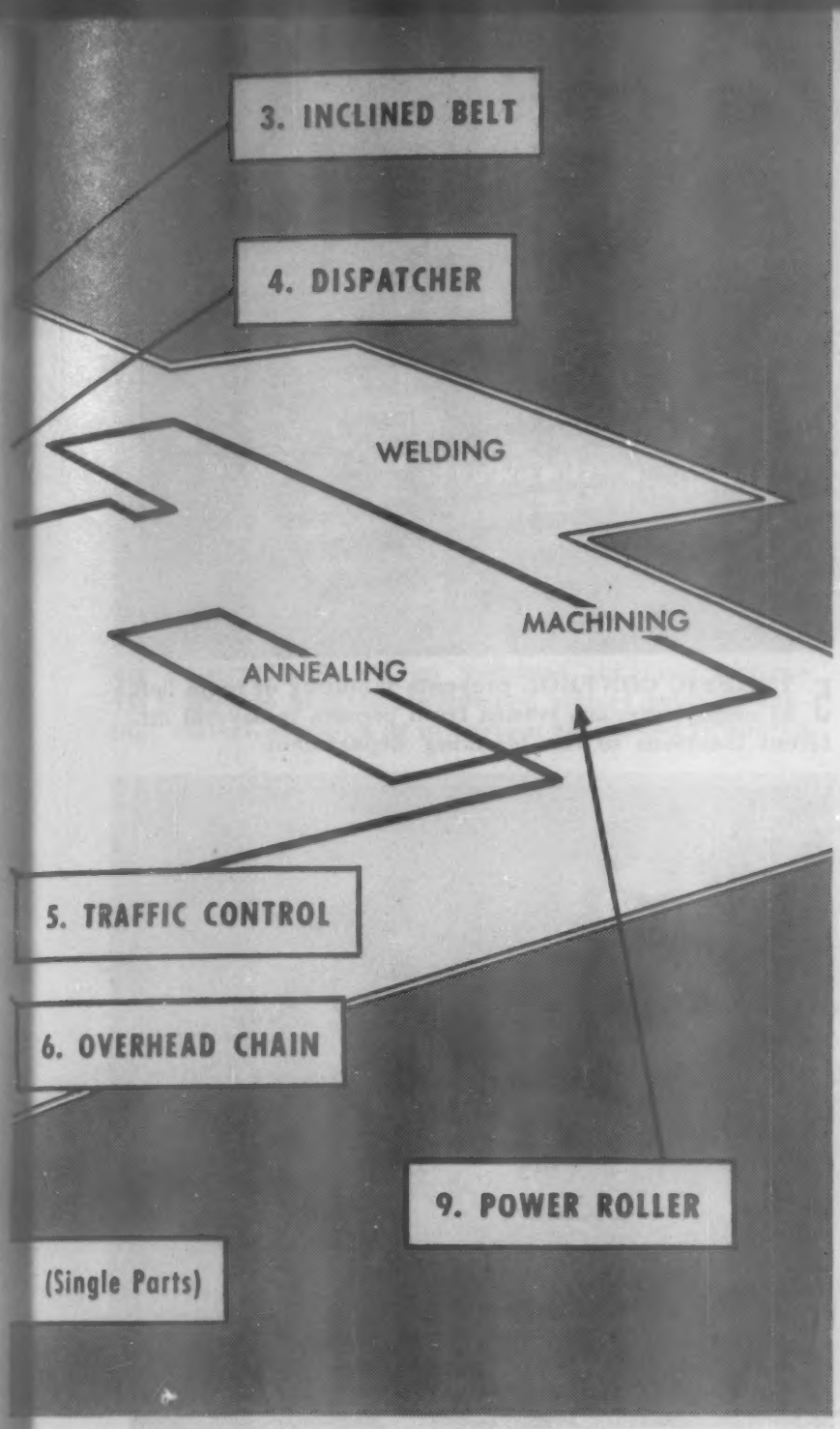
1. Low raw material inventory.
2. Reduction of losses caused by damage to parts.
3. Better quality control through maintenance of a predetermined process.

Added up, these results mean greater production efficiency, lower unit manufacturing costs.

Goal of the new layout and materials handling set-up was to hold total inventory of raw materials to the equivalent of the value of two weeks' shipments of completed parts. Such an inventory would mean a turnover rate of 26 times per year; at the present time, the rate is 22 times per year.

Fast movement of material means that if a defective part is produced at one station, the defect is likely to be discovered immediately at the next station. Corrective measures can be taken at once to prevent production of additional defects.

Two separate flow lines have been established; one



FIVE OPERATIONS, THEN SPLIT TO MERGE AGAIN AT PACKING STATION

for production of rotors, the other for stators. Total unduplicated travel of all materials handling equipment, exclusive of lift trucks, is slightly more than two miles. In addition to three 3-ton lift trucks purchased, the following equipment has been installed at Tiffin:

Powered roller conveyors—2620 feet.
Belt conveyors—1940 feet.
Overhead chain—704 feet; 79 carriers.
Overhead chain—1048 feet; 480 carriers.
Monorail conveyor—480 feet.
Gravity roller conveyors—3152 feet.
Traveling power hoists—344 feet (serve 6880 square feet).
Overhead traveling crane—200 feet (serves 10,000 square feet); 15-ton capacity.

To protect stators during the winding operation, a controlled conditions area (40,000 square feet) has been established within the main plant. Soft finish tile walls prevent glare, and hardwood maple floors insure cleanliness.

1 **TRAVELING CRANE serves 10,000 square feet in receiving area. Stocks of steel sheets are handled directly from cars on siding (left) to storage or presses**

2 **SUNKEN ROLLERS transport totepans containing stampings for stators and rotors from presses to next operation. Scrap goes to under-floor conveyor**

3 **INCLINED BELT carries scrap from beneath blanking presses to junction, then on to hopper located above gondola cars on railroad siding for move to remelt**

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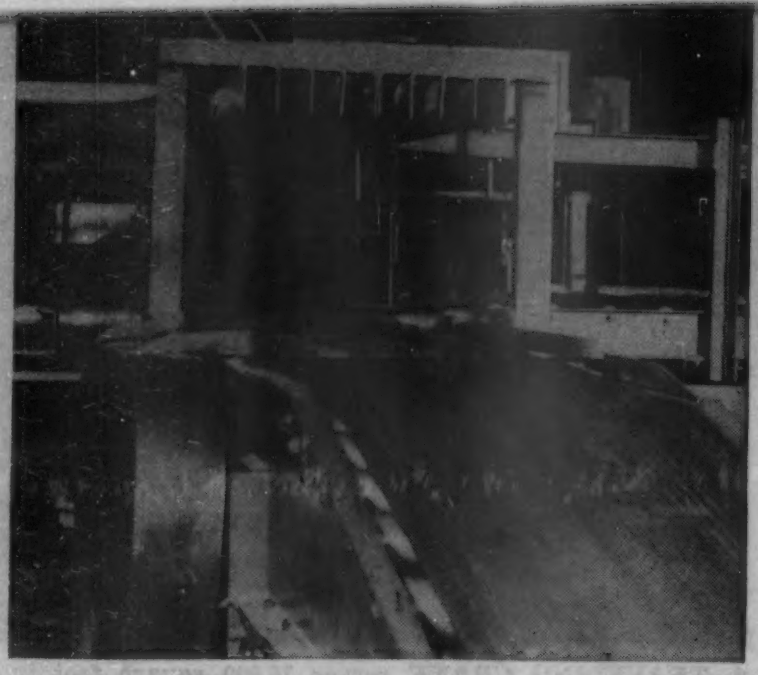


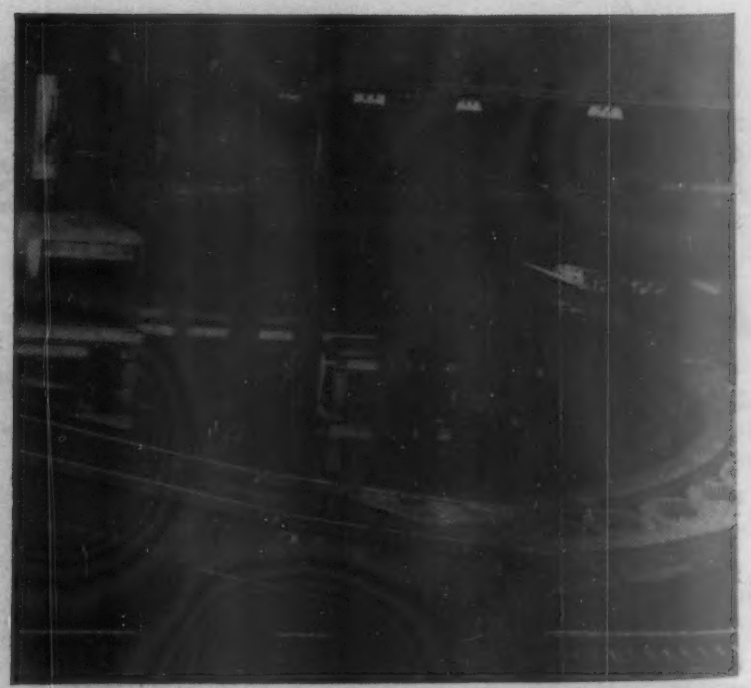
4 DISPATCHER controls movement of totepans from blanking to later operations. Setting of pins on totepan determines route it will follow after leaving belt

5 TRAFFIC CONTROL prevents jamming of main belt as empty totepans return from presses in several different locations to the blanking department

6 OVERHEAD CHAIN with special carriers moves 15-in. stacks of rotor laminations, which are collected in chutes as they drop off 3-ft.-wide belt from presses

7 GRAVITY ROLLER (single parts) carries stack of laminations on molding pin to casting press (foreground). Second conveyor returns pin for reloading

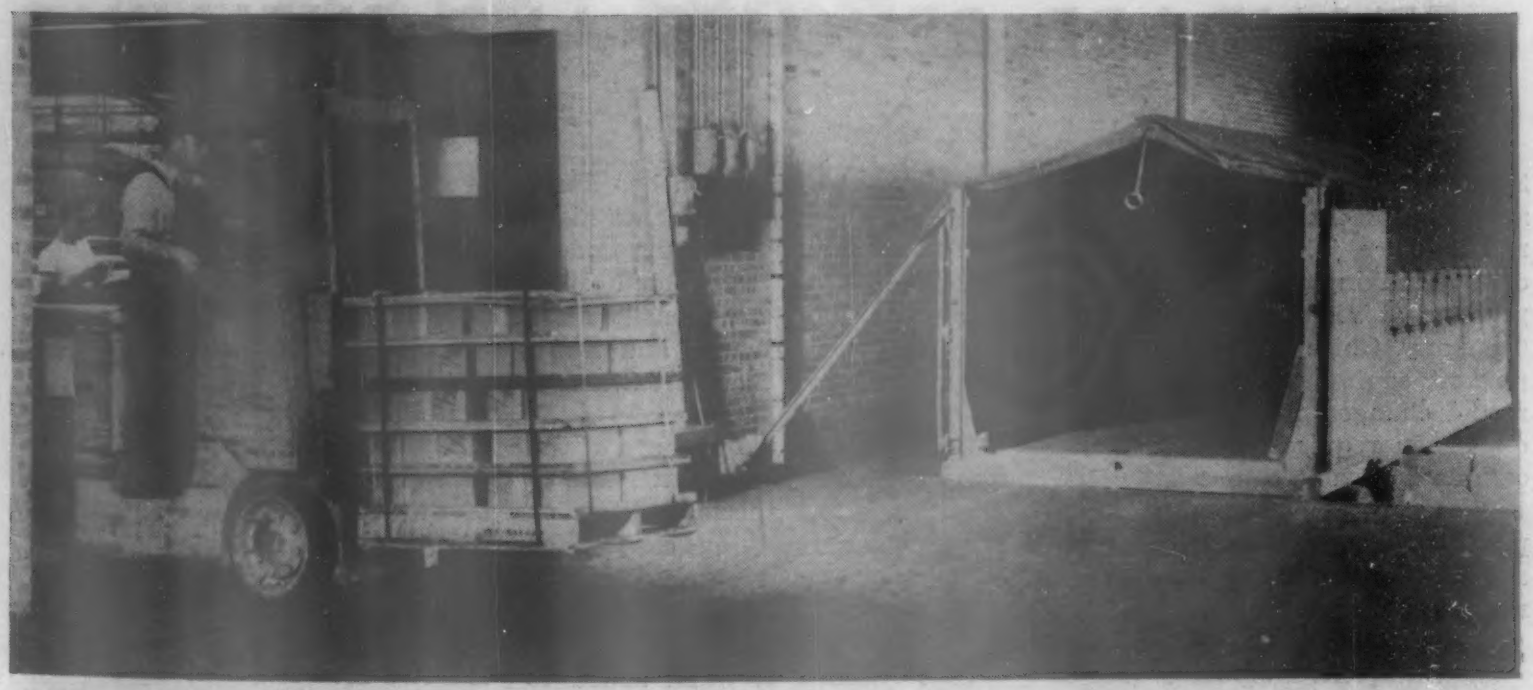
8 GRAVITY ROLLER (containers) transports molded rotors in baskets through counterweighting to oven, and (above) to buffing and turning operations



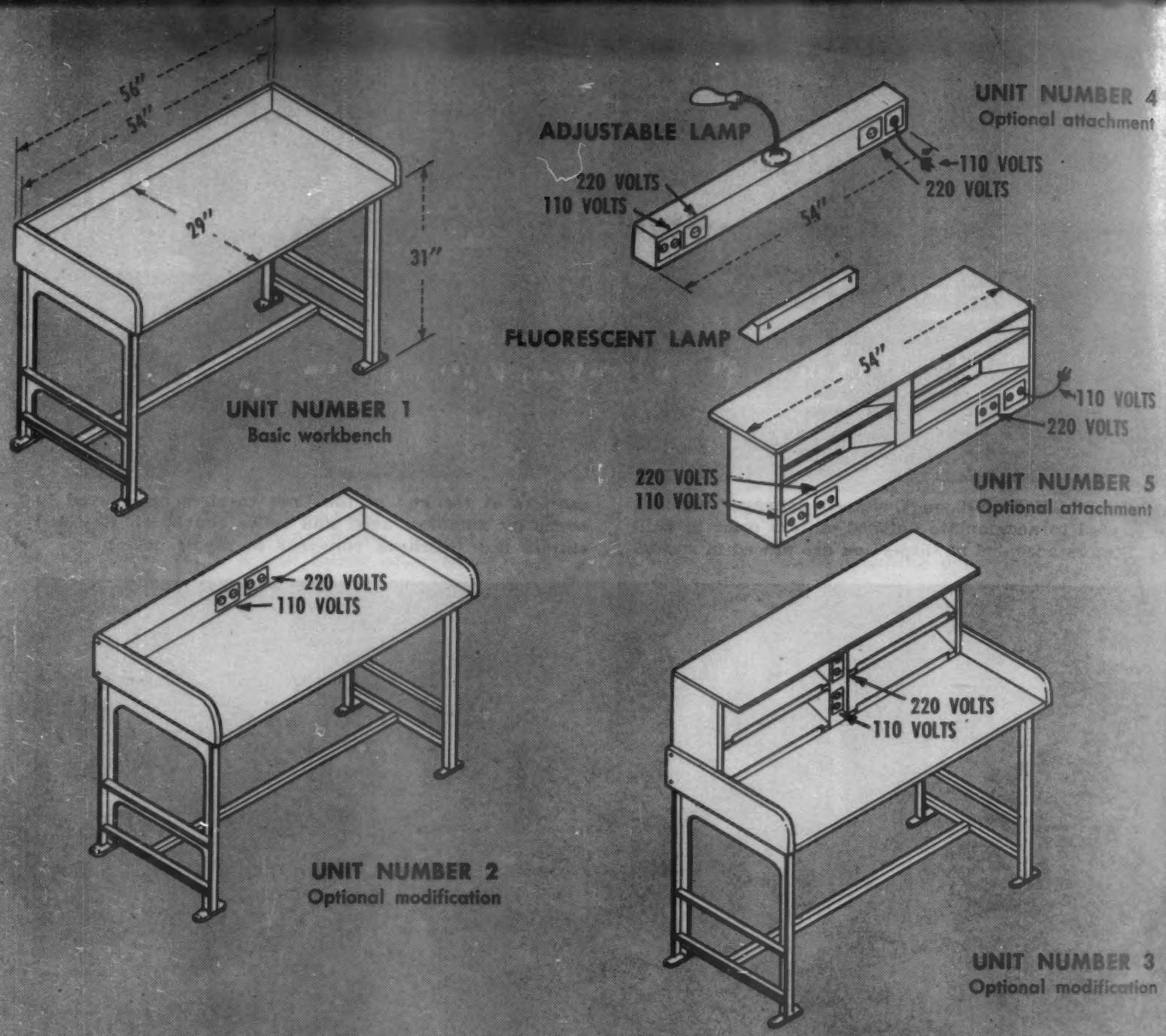
9 POWER ROLLERS are combined with belts and gravity rollers to move stator weldments to and from treating furnaces. Travel time matches cooling cycle

10 **STORAGE BANK on U-shaped conveyor sections is used to accumulate finished stators prior to baking. Stators accepted at inspection are placed in special carriers at the end of the line; carriers are moved to ovens by monorail hoist and roller conveyor. Rejected stators ride overhead convyeor to repair center**

11 **TURNTABLE, or rotary conveyor, holds three racks of stators in convenient position for tester with cathode ray oscilloscope. As more stators are needed, tester simply revolves turntable to bring them into position. Accepted assemblies go to packing table, rejects are put on overhead conveyor to repair center**



12 **FORK TRUCK with full lift moves palletized, completed assemblies from shipping room to loading dock and directly into waiting van. (For rail shipments, there is a siding at the other end of the dock.) Pallets are banded with ¾-in. steel strap. From first move to last, manual handling has been minimized**



SKETCHES ABOVE SHOW SOME OF THE POSSIBLE OPTIONAL ATTACHMENTS AND MODIFICATIONS OF THE BASIC WORKBENCH AT UPPER LEFT

STANDARD BENCHES AND SHELVING

STANDARDIZATION of all common shop equipment has simplified the maintenance job and has cut the cost of making plant moves by 50 per cent at Victor Adding Machine Company, Chicago. That is an important saving to Victor, because model changes, new products, and expansion require frequent modifications of layout.

The plant-wide standardization program has embraced benches and auxiliary equipment, shelving, cabinets, and electrical outlets.

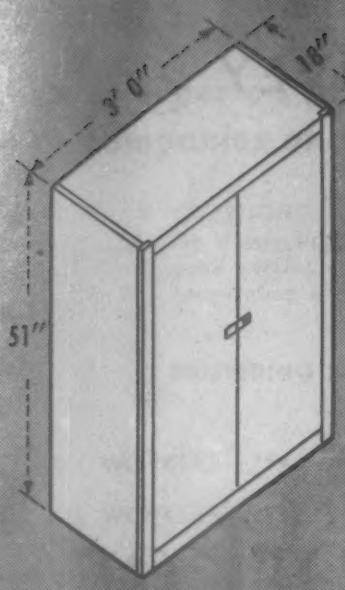
Benches. Unit Number 1 (see illustration above) is the basic bench for general use. Designed to keep all work within the normal reaching distance, it is 29 inches deep, 54 inches long, and 31 inches high. The top is finished oak; the understructure is an all-welded steel frame of standard construction. The same construction and finish are also used for Numbers 2 and 3.

Units Number 2 and 3 are of the same basic design as Unit Number 1, but have tops specially fitted for shipping or receiving clerks, for shipping or receiving clerks, foremen, or other limited applications.

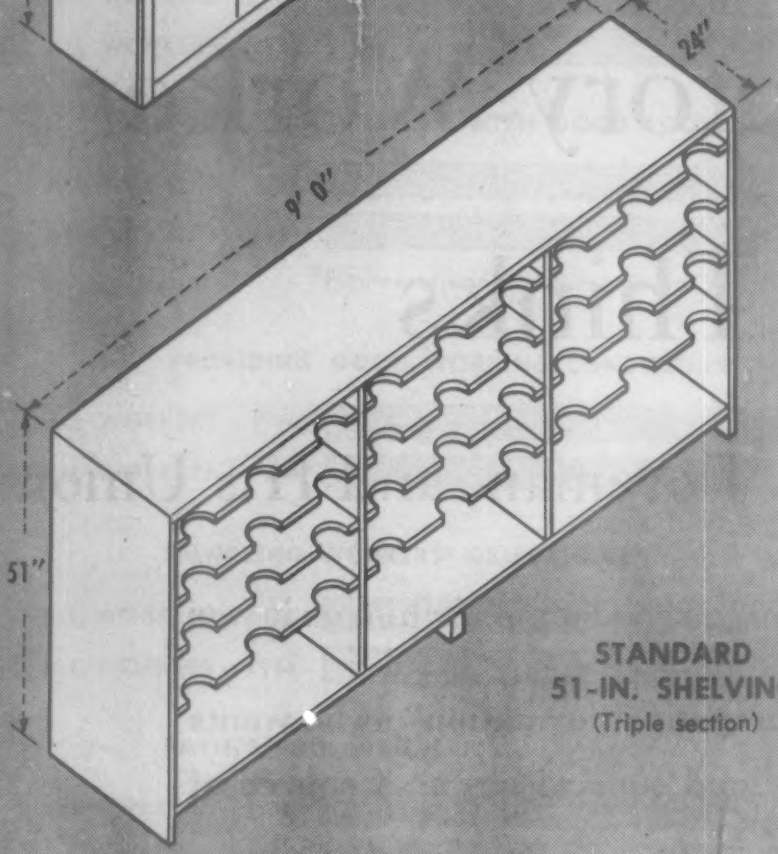
Unit Number 4, when added to the basic unit, produces a workbench for toolmakers or inspectors, or a general utility bench, with the necessary electrical connections and an adjustable, incandescent lamp to provide high-intensity illumination where needed.

Unit Number 5 can be mounted on the basic unit to make it an assembly bench. Although not physically attached, the fluorescent fixture is considered an integral part of the unit, and provides uniform, high-level illumination over the entire working surface.

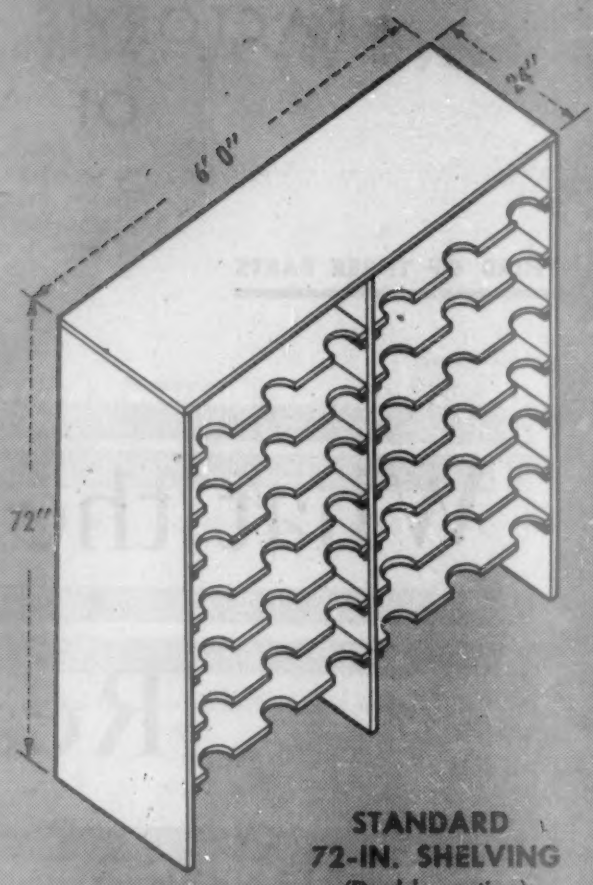
Unit Number 6 (not illustrated) is a two-drawer bench-top chest for small tools and personal belongings. The base is 12½x18 inches; height, 12½ inches.



STANDARD
TOOL CABINET



STANDARD
51-IN. SHELVING
(Triple section)



STANDARD
72-IN. SHELVING
(Double section)

THREE-, 6-, AND 9-FT. LENGTHS FOR SHELVES AND CABINETS PERMIT MAXIMUM UTILIZATION OF THE SPACE AVAILABLE BETWEEN COLUMNS

EASE PLANT LAYOUT

Unit Number 7 (not illustrated) is similar to Unit Number 4, but contains three drawers, and is used where space for more than a normal number of tools is required.

All four of the optional bench units (Numbers 4, 5, 6, and 7) are made of plywood sections, and are made to be bolted to the benches.

Shelving. The basic shelving unit is 24 inches deep, 51 inches high, and comes in lengths of 3, 6, and 9 feet. The 9-ft. size is illustrated. Where additional storage space is required in a given area, a 72-in. high modification of the basic unit is available. The taller unit is made in 3- and 6-ft. sections; the "double" section is shown above. Miscellaneous tools are stored in closed cabinets of the type illustrated; to provide uniformity, the cabinets also are 51 inches high and 3 feet long. All units are made of stained and varnished plywood.

The 3-, 6-, and 9-ft. lengths for shelving units were decided upon to provide maximum utilization of the space between columns, which is 18 feet 4 inches. This arrangement permits aisles to be installed conveniently at any point. If a pedestrian aisleway is required, a 9-ft. and a 6-ft. unit are combined to provide a 3-ft. 4-in. aisle. Two 6-ft. units provide a 6-ft. 4-in. aisle for moving parts in the machine shop.

Electrical outlets. Permanent outlet boxes have been installed on the walls throughout the plant. Boxes are spaced 71 inches on centers, so that with the 29-in. deep bench set perpendicular to the walls, aisleways of 42 inches are provided automatically.

Results. Standard dimensions of units simplify layout planning as well as actual moves. The need for individual measurements and scaling is eliminated; the nearest of interchangeable units, may be moved to the new position. And there is no longer a need to rewire an entire department every time there is a minor layout change.

FACTORY'S FIFTH ANNUAL SURVEY
OF WORKER OPINION

THIRD OF THREE PARTS

What the Factory Worker Really Thinks

About His Company, His Foreman, and His Union

1. He thinks his company is doing as good a job for him as it was in 1944, but no better
2. He is not getting as much "company information" as he wants
3. He does not accept foremen and supervisors as a source of company information
4. He is slightly less inclined than he was in 1944 to rate his foreman as good
5. He is less inclined than he was in 1946 to think Communists have much influence in unions
6. He is undecided whether union leaders are doing a good job

MANAGEMENT IS DOING A BETTER JOB for workers that it was doing in 1944, yet workers do not recognize that fact. Management is making a greater effort than ever to transmit information to workers, yet workers say they are not getting as much information as they want about their companies.

This survey provides at least one clue for management seeking to know *why*. The clue is this: Workers do not accept foremen and supervisors as a channel of communication—in fact, they rate it as a poor seventh. Yet it is upon foremen and supervisors that management is placing great reliance to get information to workers.

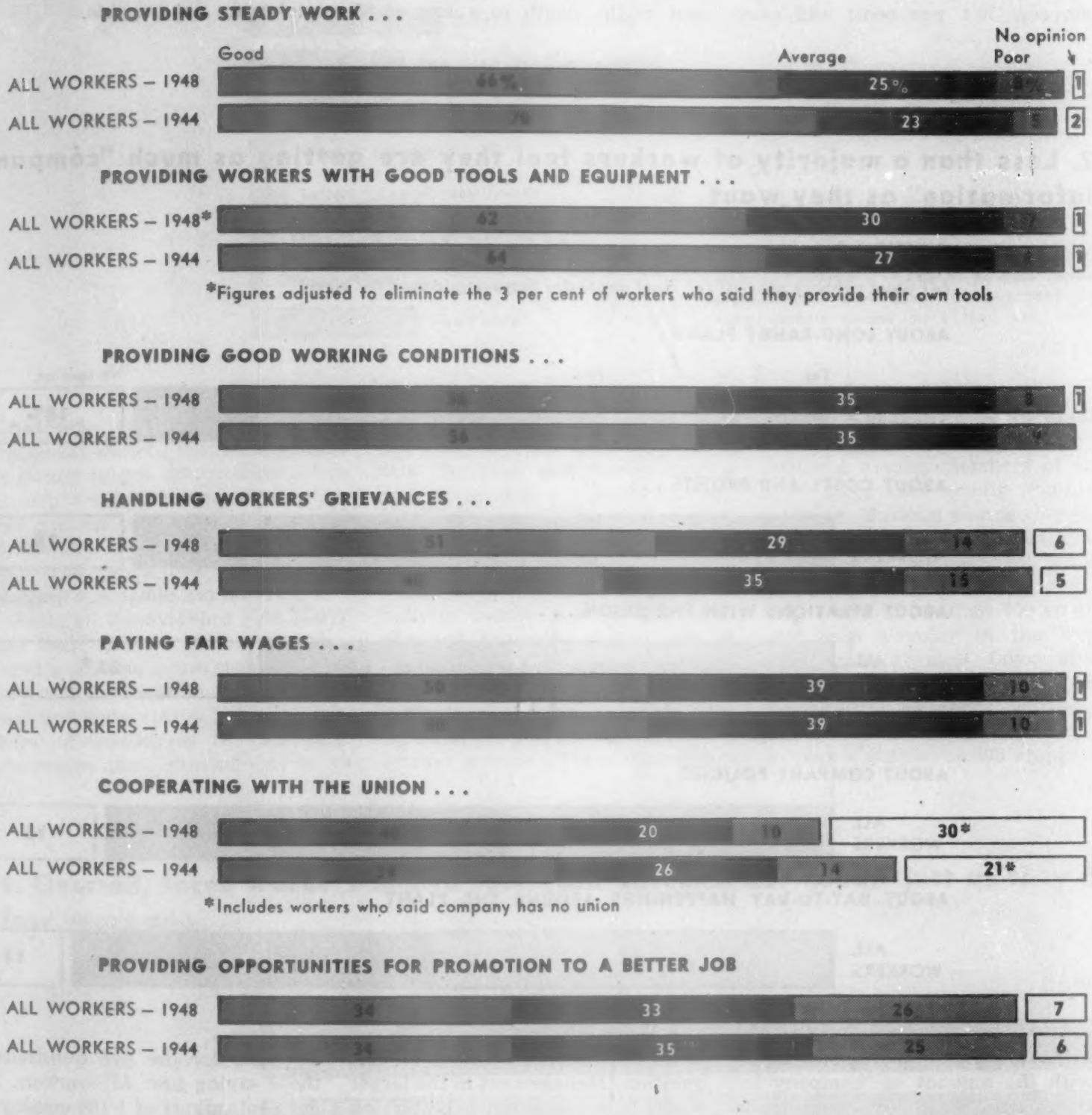
It would be dangerous to conclude that management should abandon its efforts to transmit information through foremen and supervisors. But it would be even more dangerous for management to neglect those channels of communication which workers more readily accept.

This is the third of three articles based on FACTORY's fifth annual survey of worker opinion. The survey was made for FACTORY by the McGraw-Hill Research Department. Interviews were conducted in 34 states containing 97 per cent of the factory workers in the United States, and were allotted in proportion to geographical concentration of manufacturing workers, type of industry, size of plant, union affiliation (or lack of it), age group, and sex.

The following geographical designations are used:
New England: Conn., Me., Mass., N. H., R. I., Vt.
Middle Atlantic: N. J., N. Y., Pa.
East-North-Central: Ill., Ind., Mich., Ohio, Wis.
South: Ala., Ark., Del., Fla., Ga., Ky., La., Md., Miss., N. C., Okla., S. C., Tenn., Tex., Va., W. Va.
West: Ariz., Calif., Colo., Iowa, Idaho, Kan., Minn., Mo., Mont., Neb., N. D., N. M., Nev., Ore., S. D., Utah, Wash., Wyo.

1. Over a period of four years, workers have changed little in the way they rate their companies on seven key points

QUESTIONS: Would you rate your company as good, average, or poor on (a) providing steady work; (b) providing workers with good tools and equipment; (c) providing good working conditions; (d) handling workers' grievances; (e) paying fair wages; (f) cooperating with the union; (g) providing opportunities for promotion to a better job?



ANALYSIS: The lack of any significant change over a four-year period (except on handling workers' grievances) means that the companies which are doing a better job in these fields (and there are many) have failed to make employees conscious of the improvements—or else that enough companies are now doing a poorer job than in 1944 to make the net change negligible. FACTORY believes that the first explanation is the true one, and that the replies to Question 2 (next page) tend to support its belief in this matter.

There is little difference in the way union members and non-members rate their companies. Eliminating the question of cooperating with the union (because 85 per cent of non-union workers have no opinion or work in plants where there is no union), the average per cent of non-union workers saying their company is doing a good job is 56.5; among union members the average is 51.3 per cent.

With a single exception, workers in the South give their companies the highest percentage of "good" votes. The exception is cooperation with the union, probably accounted for by the fact that 45 per cent of Southern workers are employed in plants without any union. Workers in the West register the highest "good" vote in this case, and second highest in every other.

Average per cent saying "good" in the various regions: New England, 45.3 Middle Atlantic, 45.1;

East-North-Central, 48.9; South, 59.9 and West, 59.4 per cent.

Plant size and worker age have an influence on the answers, too. Here are the averages (for the seven questions) of those answering "good": Plants with up to 100 employees, 44.1 per cent; 101-250 employees, 47.9 per cent; 251-500 employees, 50.1 per cent; and over 500 employees, 55.9 per cent. Workers 20 to 34 years of age, 47.9 per cent; 35 to 54 years, 52.4 per cent; and 55 years and over, 54.1 per cent.

The variation by geographical region was more pronounced on some questions than on others. On providing opportunities for promotion, it ran from a high of 52 per cent in the South to a low of 25 per cent in New England (27 points). The same regions were at the extremes on the matter of paying fair wages, but the range was only 15 points (58 and 43 per cent, respectively).

Detailed breakdowns by the various worker groups were not made in 1944, so comparisons (other than totals) are not possible.

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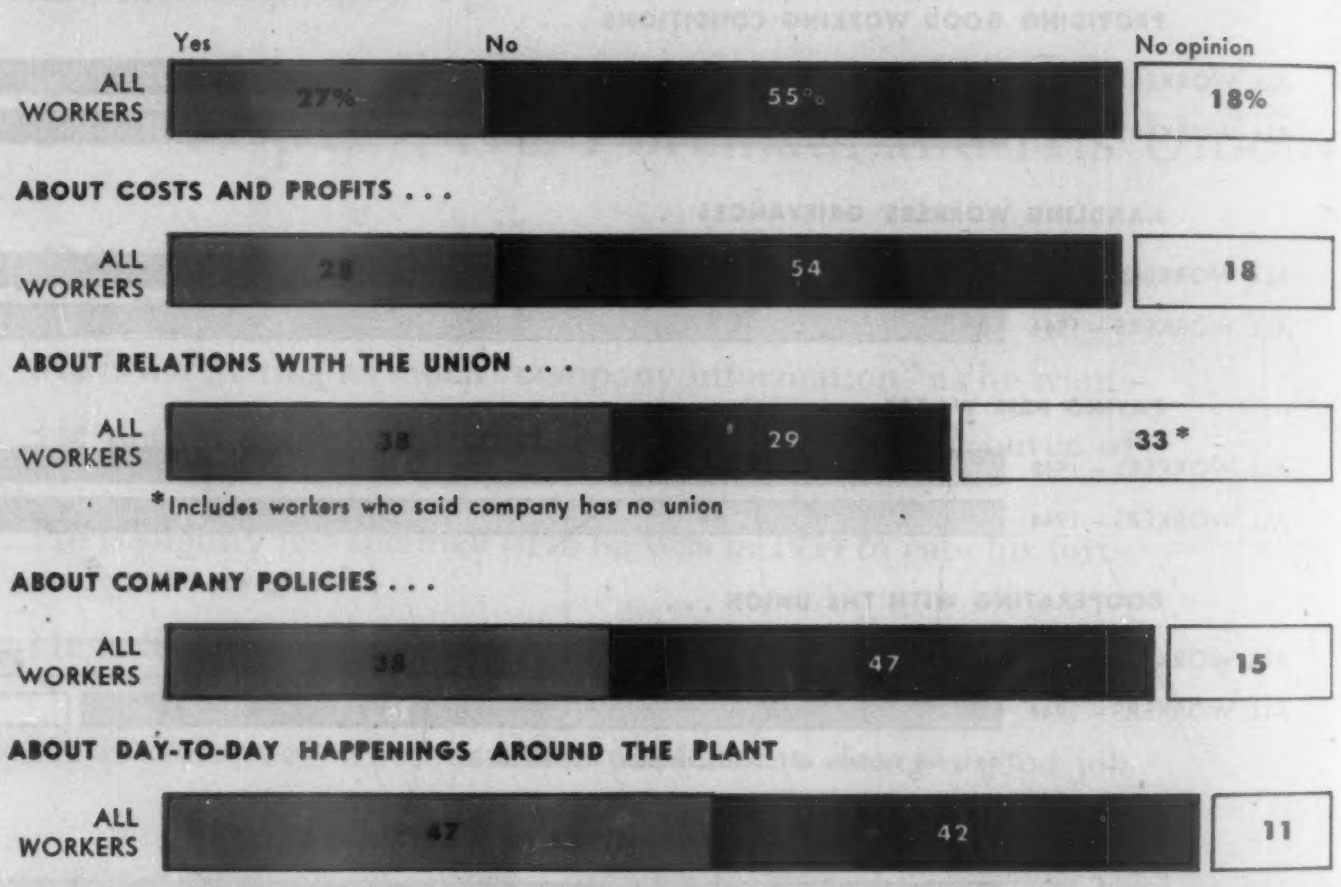
2. Less than a majority of workers feel they are getting as much "company information" as they want

QUESTION: Does your company give you enough information (a) about its long-range plans; (b) about costs and profits; (c) about relations with the union; (d) about company policies; (e) about day-to-day happenings around the plant?



ANALYSIS: Workers are not satisfied with the amount of "company information" which is being made available to them. Management is doing a better job of getting across information about some things in some fields than about others, but even management's best—reporting day-to-day happenings around the plant—is not very good (47 per cent of workers satisfied). And in the important job of conveying information about costs and profits, management's record is just plain bad (only 28 per cent of workers say they get enough).

Size of plant has a pronounced effect on workers' opinions on this question. Management in the larger plants is doing a much better job than management in the smaller plants. On the matter of costs and profits, for example, only 16 per cent of workers in plants of less than 100 employees think they are getting enough information. In plants of 101-250 employees, 20 per cent think so; in plants of 251-500 employes, 24 per cent. But in plants of more than 500 employees, 39 per cent say they are getting enough information about costs and profits.

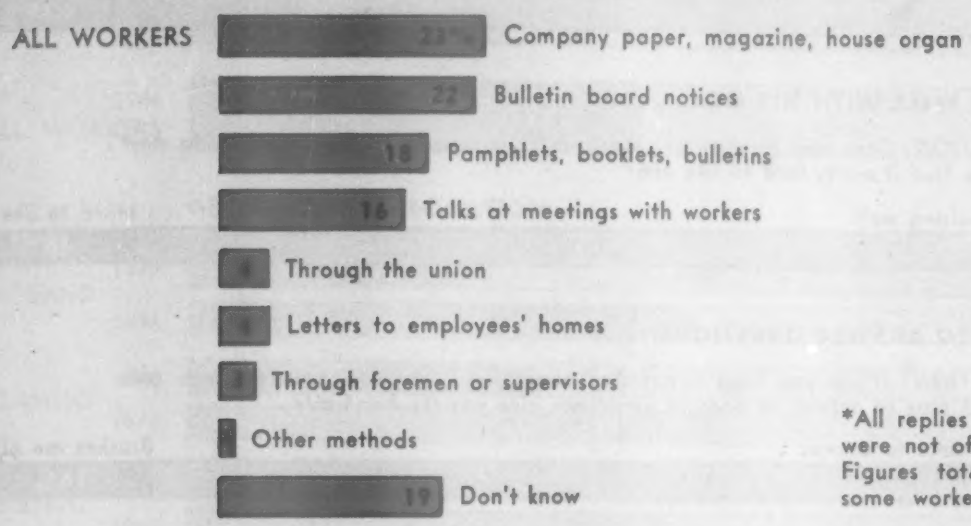
The pattern is virtually the same on all five questions. Here are the averages for the five questions of those saying *yes:* All workers, 35.6 per cent; plants of 1-100 employees, 23.0 per cent; 101-250 employees, 30.6 per cent; 251-500 employees, 34.6 per cent; and over 500 employees, 44.4 per cent.

Regional variations are also present, but not as pronounced as those by plant size. The composite figures for the five questions: New England, 29 per cent say *yes:* Middle Atlantic, 33.8 per cent; East-North-Central, 36.4 per cent; West, 38.6 per cent; South, 39.2 per cent.

There are only small variations among other groups.

3. Workers favor house organs, bulletin boards, pamphlets, and meetings — not supervisors — as sources of company information

*QUESTION: In what way would you like to have your company get information to you about its costs, profits, plans, and so on?**



*All replies were volunteered (i.e., respondents were not offered a choice of possible replies). Figures total more than 100 per cent since some workers named more than one method

ANALYSIS: Replies to Question 1 (page 83) showed that management is failing to get information across to employees, even though employees express a desire for more information (see Question 2, page 84). The replies to this question suggest a possible explanation.

From all the evidence FACTORY has been able to gather, management is making a concerted effort to transmit information through foremen and supervisors. Intensive surveys of employees of individual companies have proved this to be successful in some instances. But the fact that workers in general rate "foremen and supervisors" a poor seventh as a channel of communication may indicate that management, in many cases, is trying to do the job "the hard way."

The emphasis workers place on bulletin boards is a cue for management to make greater use of this frequently neglected means of communication.

There are some marked variations of opinion among the several worker groups. Those that follow are large enough to be significant:

House organs find greatest acceptance among members of CIO, least acceptance among non-union workers. Bulletin boards rate highest in the South and lowest among members of independent unions. Pamphlets are most popular in plants with more than 500 employees, least popular in the South. Talks find greatest favor among non-union workers, least favor among CIO members, workers in the East-North-Central section, and in plants with over 500 employees.

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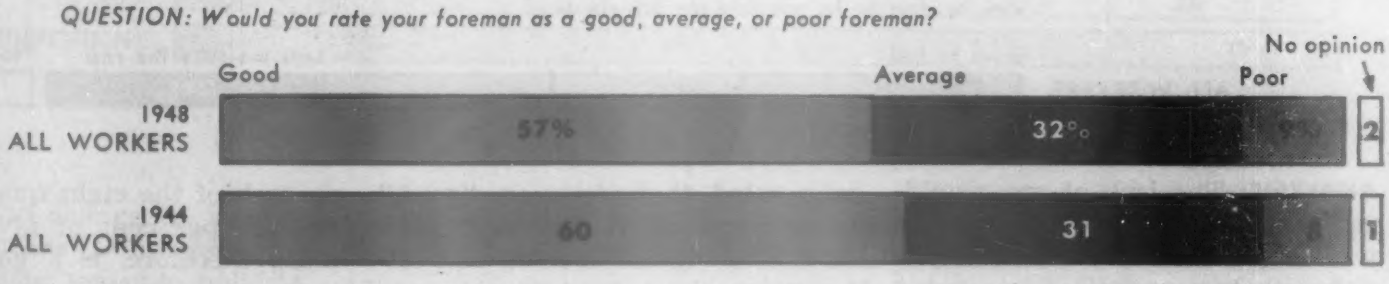
4. Over-all, three workers in five rate their foremen as "good," just as they did four years ago . . .

QUESTION: Would you rate your foreman as a good, average, or poor foreman?



. . . and at least three workers in five believe their foremen are doing a good job on each of eight key points

THE FOREMAN "KNOWS HIS STUFF" . . .

QUESTION: Does your foreman "know his stuff," or would you say he doesn't know very much about his job?

. . . LEAVES HIS MEN PRETTY MUCH "ON THEIR OWN" . . .

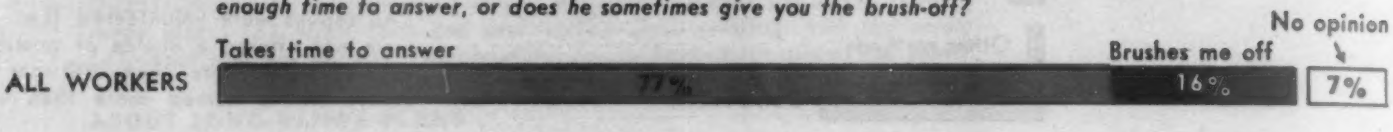
QUESTION: Does your foreman leave you pretty much on your own, or does he check up on you too much?

. . . GETS ALONG WELL WITH HIS MEN . . .

QUESTION: Does your foreman get along well, personally, with his men, or do most people find it pretty hard to like him?

. . . TAKES TIME TO ANSWER QUESTIONS . . .

QUESTION: When you have a question about your job, does your foreman take enough time to answer, or does he sometimes give you the brush-off?



. . . IS SATISFIED WITH A FAIR DAY'S WORK . . .

QUESTION: Does your foreman drive you and demand too much work, or is he usually satisfied with a fair day's work?

. . . DOES NOT CRITICIZE IN FRONT OF OTHER MEN . . .

QUESTION: Does your foreman bawl out his men in front of other workers, or does he usually speak to them in private when he thinks they've pulled a boner?

. . . IS IMPARTIAL WITH HIS MEN . . .

QUESTION: As a rule, is your foreman impartial, or does he have some favorites who get the breaks?

. . . AND GOES TO BAT FOR HIS MEN WHEN SOMETHING GOES WRONG

QUESTION: Does your foreman usually go to bat for you when something goes haywire, or does he let you take the rap yourself?

ANALYSIS: The lack of any significant change since 1944 in the way workers rate their foremen means either that management has failed to improve the caliber of its foremen during the post-war shakeout, or that opposing forces have undercut whatever improvements management has made.

There is a distinct relationship between the replies to the eight specific questions and the over-all ratings. Among all workers, an average of 72 per cent gave "favorable" replies to the eight questions; among the 57 per cent of workers who rated their foremen "good," an average of 88 per cent gave favorable replies. Among this latter group, the poorest record made by the foremen was on the matter of bawling their men out in public; only 78 per cent gave a favorable reply.

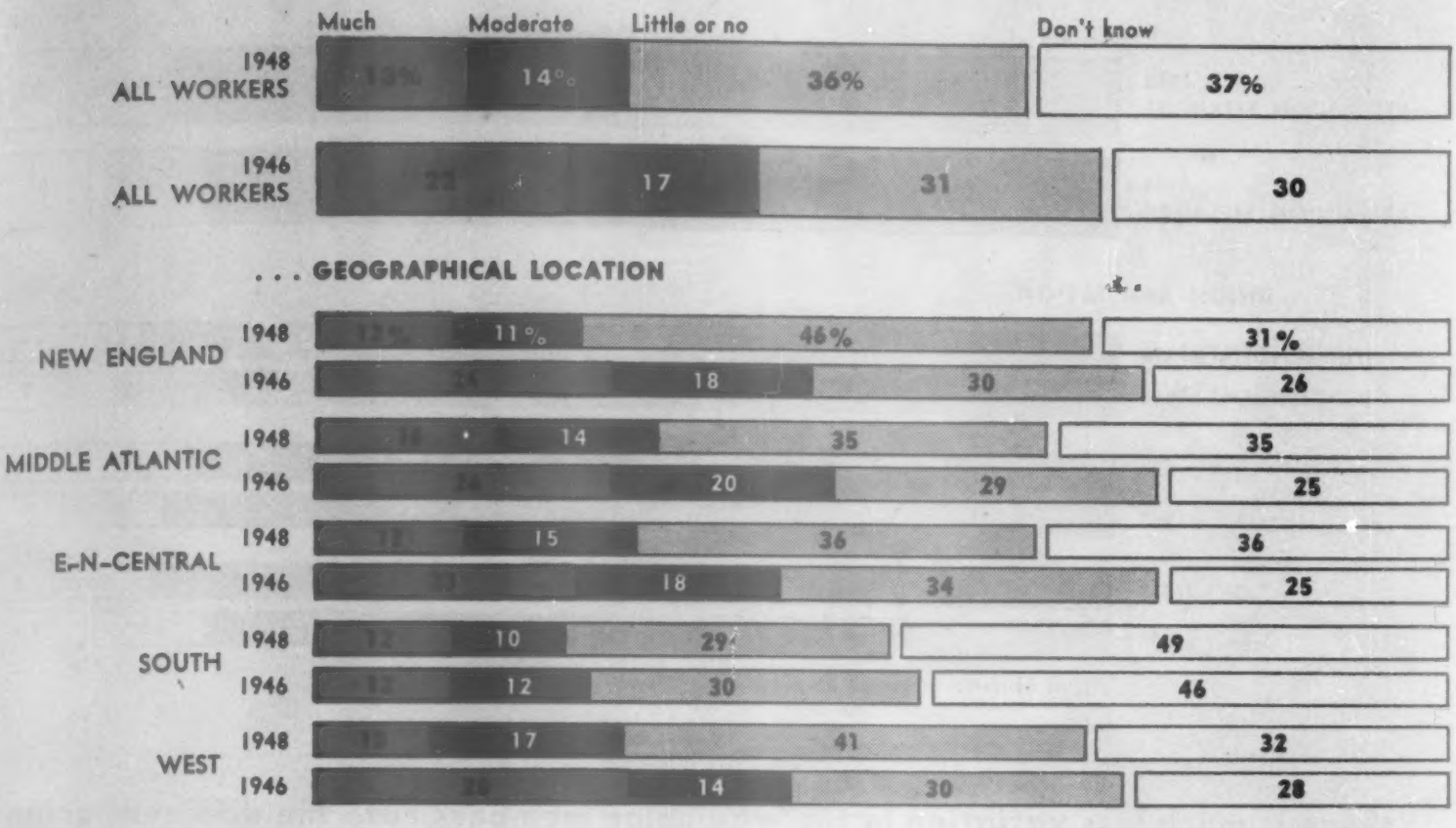
Further analysis shows that 28 per cent of all workers gave a favorable reply to every one of the eight questions; within this group, 92 per cent rated their foremen as "good," 8 per cent as "average."

The several regions and union groups follow a consistent pattern on each of the eight questions; the average per cent of favorable replies, therefore, is a good indication of results on individual questions. The second figure in each case is per cent of workers who rated their foremen as "good": West, 79.6 and 66; South 76.9 and 61; New England 74.4 and 55; East-North-Central, 70.6 and 56; Middle Atlantic, 65.2 and 51.

By union status: Non-union workers, 74.8 and 61; AFL members, 72.8 and 59; members of independent unions, 72.4 and 57; CIO members 69.1 and 53 per cent.

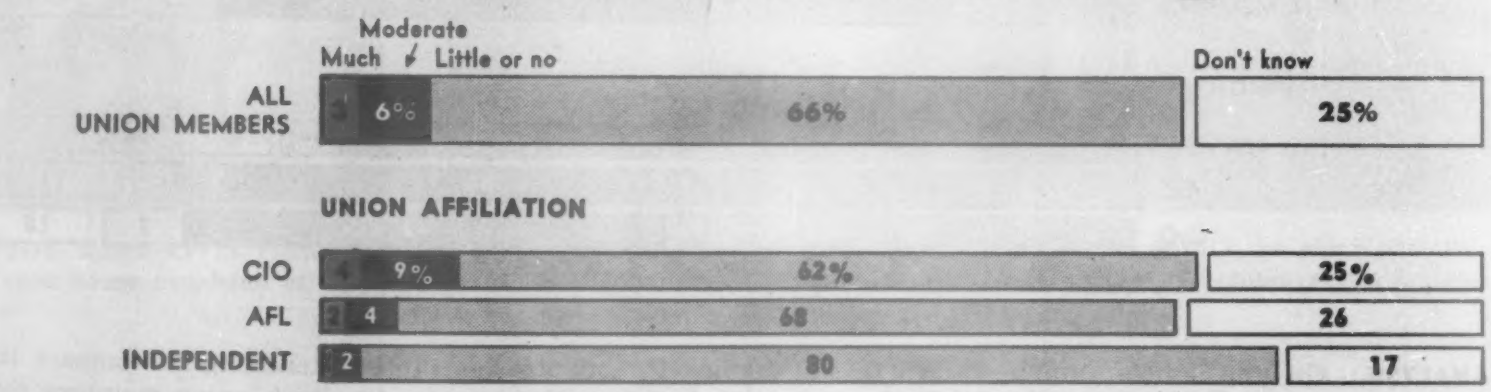
5. One worker in eight believes Communists have much influence in unions, compared with one in five two years ago . . .

QUESTION: Do Communists have much, moderate, or little or no influence in unions?



. . . and only one union member in thirty believes the Communists have much influence in *his* union

*QUESTION: Do Communists have much, moderate, or little or no influence in your union?**



*Asked of union members only

ANALYSIS: The change in worker opinion regarding Communist influence in unions seems to indicate that unions not dominated by Communists (and, to a lesser extent, management) have failed to keep the rank and file aware of the Communist threat. (See "The Red Menace in Labor and How to Fight It," FACTORY, September, 1948.)

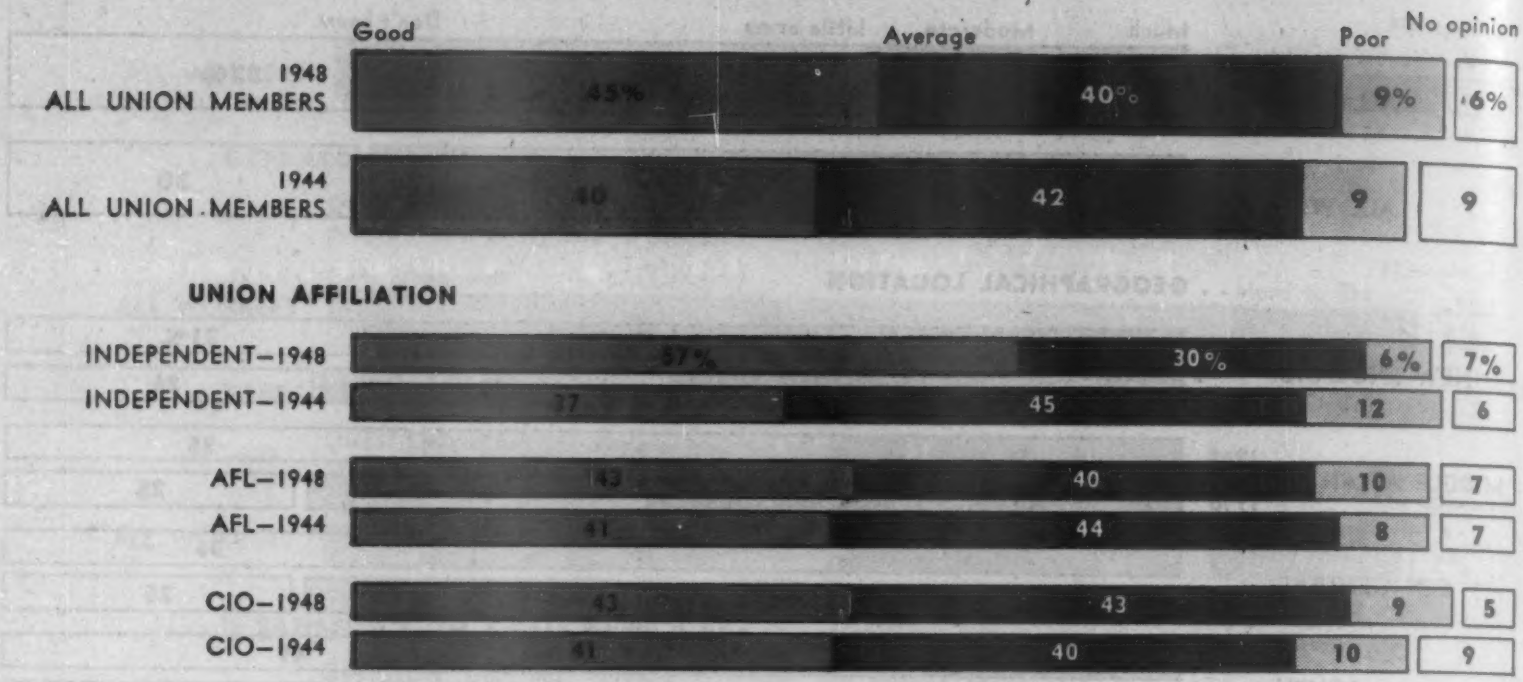
Non-union workers are more inclined than are union members to recognize the presence of Communist influence; 19 and 11 per cent, respectively, say Communists have "much" influence. Beyond that, the only significant variations among the worker groups are in the five geographical regions.

That so few workers believe their unions are subject to Communist influence (compared with the number who believe "unions" in general are so influenced) indicates the Reds are doing a successful job of disguising both their purpose and their presence. This is emphasized by the fact that although about 20 per cent of CIO members belong to Communist-dominated unions, only 4 per cent of CIO members feel there is "much" Communist influence in their union, and only an additional 9 per cent feel that the Communists have "moderate" influence in their union.

The relative changes that have taken place within some of the regions since 1946 may also be indicative of the degree of refinement achieved by the Communists in confusing the issues at a local level.

6. Reversing the situation of 1944, members of independent unions are now more likely to rate their *local* leaders as "good" than are members of AFL or CIO . . .

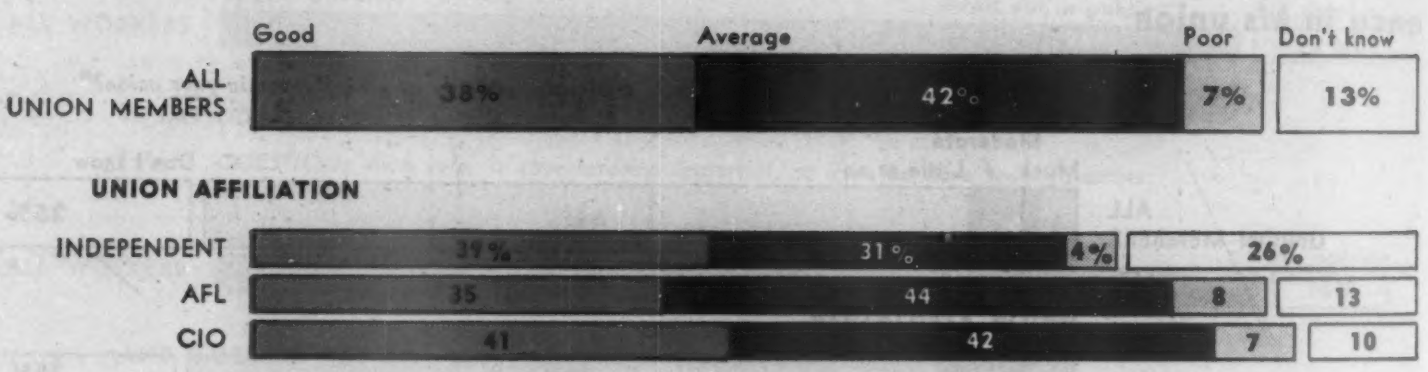
*QUESTION: Would you rate your local union leaders as good, average, or poor?**



*Asked of union members only

. . . there is much less variation in the way union members rate the different unions of their *national* leaders

*QUESTION: Would you rate your national union leaders as good, average, or poor?**



*Asked of union members only

ANALYSIS: On the whole, union members are slightly more inclined this year (45 per cent) to rate their local unions leaders as "good" than they were in 1944 (40 per cent). The tremendous change in opinion among members of independent unions is surprising, and the causes are matters for speculation.

Workers in the heavily unionized East-North-Central section are least likely to rate their leaders (both local and national) as "good"; workers in the relatively little unionized South are most likely to do so. Worker age and plant size have little effect on how union members rate their leaders.

It is interesting to compare the way in which union members rate their foremen (in whose selection they have no voice) and their own local leaders (whose selection they can control through election). Fifty-five per cent rate their foremen "good"; only 45 per cent give that rating to local union leaders.

This is Part III of FACTORY's Fifth Annual Survey of Worker Opinion. The others . . .

IN OCTOBER, Part I. What the Factory Worker Really Thinks About the Taft-Hartley Law and Labor in Politics

IN NOVEMBER, Part II. What the Factory Worker Really Thinks About Wages, Costs, Prices, Profits, and Strikes

THE MIDWAY at Pacific Car & Foundry Company's open house consisted of this display of the company's products. Additional exhibits within the plant permitted families and friends to see the employees in action

PRODUCT SHOW FEATURES OPEN HOUSE

COMPANY PRODUCTS, displayed along a "midway," were the first things visitors saw at the open house recently held at Pacific Car & Foundry Company, Renton, Wash. Tractors, trucks, buses were lined up just inside the entrance to the plant property, where all visitors had to pass. On the midway, too, was an "old timers' booth." Here men who had worked in the plant as far back as 1910 could sign a register (102 did), and meet their former fellow-workers.

Careful preparation and much publicity combined to make the open house—the first held by this company—an outstanding success. A committee of 72 plant people, working for months in advance of the event, had charge of the program. Engraved invitations were sent to public officials, business executives, service club members, personnel of the company and its affiliates. Radio time was used, too.

About 4500 visitors toured the plant during the open house hours —2 to 5 p.m. Everyone was given an institutional folder and a copy of the house organ, which included a map of the route taken through the 51-acre plant.

WORK SESSIONS INCLUDED TALKS BY INDUSTRIAL LEADERS; COMPANY EXECUTIVES* TOLD, IN GREAT DETAIL, PLANS FOR THE COMING YEAR

CONFERENCE INCLUDES SUPERVISORS

ROBERT A. DILLEY • ASSISTANT EDITOR, FACTORY

A WELL-INTEGRATED management team left Asbury Park, N. J., at the close of a conference of supervisors and top management members of American Type Founders, Inc., Elizabeth, N. J. Sessions were held at the Berkeley-Carteret Hotel.

"Looking Ahead," was the conference theme. One hundred and fifty members of management, from Vincent H. Halsall, newly appointed assistant foreman, to Thomas Roy Jones, chairman of the board, had been given a thorough briefing on the company's plans for the coming year.

In general, they learned about the company's over-all plans. In detail, they studied the programs of the safety, methods, production, quality control, and training departments. They heard the first announcement of their company's purchase of another manufacturing subsidiary. They were given first notice of their company's new products. Here was a management team getting its signals in one big huddle.

Revealed also for the first time was the plan for American Type Founders' new supervisory training program. From well-known leaders in industry participants received reports on current developments in labor and management relations, and trends in supervisory practices. When the conference ended, there could be no doubt in anyone's mind that he was a true member of management.

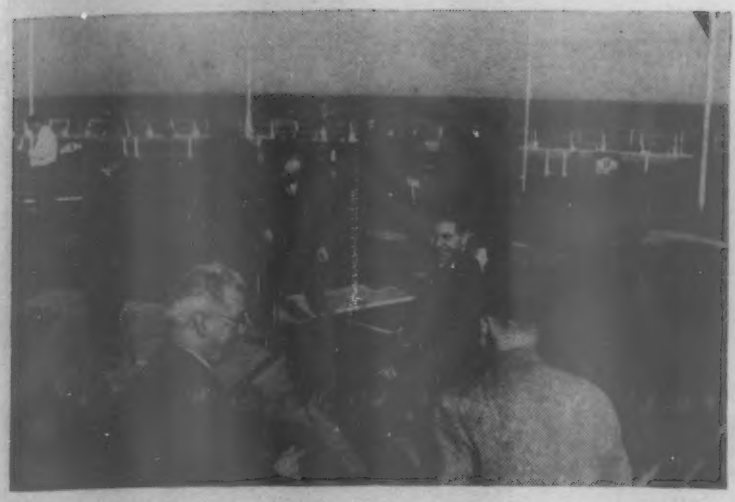
Aside from reasons outlined above, three other objectives deserve mention. First, the conference was a big step in a sustained effort to integrate the lower ranks of management into a smoothly functioning team.

The second objective was to bring the program of the lower and middle management groups into sharper focus for top management.

The third objective was to integrate and focus the thoughts and actions of the entire team on the company's manufacturing future.

The conference got off to a good start on Friday evening when the chairman of the board defined its scope and set its tone. A second address dealt with current developments in labor-management relations. The last speaker of the evening told the group how to have a successful future.

***Top row, left to right: Robert Nelson, vice-president in charge of production; Thomas Roy Jones, chairman of board; Carroll French, director, industrial relations, NAM; Dr. Norman Peale, clergyman-author. Bottom row, left to right: Glenn Gardiner, vice-president, Forstmann Woolen Company; James McGuire, foreman, inspection department; John Egan, safety director; W. C. Stafford, training director**



PLAY SCHEDULES OFFERED SPORTS AND RELAXATION IN DAYTIME, WITH FINE FOOD AND GOOD FELLOWSHIP AT EVENING BANQUET SESSIONS

IN MANAGEMENT TEAM

Planning for the conference was both unobtrusive and complete. Because it started on a Friday evening, all participants were preregistered at the hotel. All rooms were open and ready for the men.

The day before the conference each man received a packet containing instructions, his room number, his banquet table assignments, a lapel tag, menus for the two banquets, a program of events, and a sports schedule. The supervisors took their packets home. They were thus prepared to bring the proper clothes and sports equipment.

Seating arrangements were planned to mix the group. Since two plants were represented, not all the men were acquainted. All group sessions were covered by a photographer and all proceedings were recorded for transcription, and publication as a memorial brochure.

The session held Saturday morning was specific. It was devoted to talks by department heads about their operations. These talks had been prepared weeks ahead and were well supported with visual aids. At the halfway mark in the morning's meeting, coffee and breakfast rolls were served on a terrace overlooking the ocean. All speakers adhered strictly to schedule, so the session closed on time.

Work and Play

There was a splendid balance between work and free time. Following an informal luncheon, men met their respective sports captains at appointed times and places. After a session of relaxation, or rest, as they preferred, they reconvened for the evening's banquet. There were no speeches. After dinner, entertainment was supplied by members of the organization. A costumed gag-band paraded around and serenaded the group until it was "lousy with culture." Fervently clapping a pair of broken cymbals was Pres. Ed. Williams. Prizes were awarded to contestants in the afternoon's sports. A magician gave the group a hilarious show.

Sunday was a free day with no meetings, schedules, or restrictions. Sports were again available at company expense. All bills and gratuities were handled by the company.

The conference program has been described in detail to illustrate that the company went all out in preparation and planning. Nothing was left undone that might have increased the success of the venture. Important is the fact that less than half of the entire weekend was devoted to business. This was possible, at no sacrifice, because of the intensive planning and preparation for the conference.

Because of this conference, the ATF management team is fully informed and its members know each other better. American Type Founders believes that it pays to put on such a program to spur productive effort, and to put it on with all the flair and zest and enthusiasm of a sales conference.

2 per assembly

MONTHLY SHIPPING REQUIREMENTS

SALES ORDER		Shipped	Feb. 20	Mar. 20	Apr. 20	May 20	June 20	July 20		BALANCE
704 -510	724	292	190	176	66					
710- 515	628				110	176	176	166		
803 -506	8							8		
TOTAL		292	190	176	176	176	176	174		
		Bracket						RP 1805		

PERFORMANCE AGAINST REQUIREMENTS

		Shipped	Feb. 20		Mar. 20		Apr. 20		May 20		June 20		July 20			SCRAP NOT ENTERED
			D 10	D 26	J 10	J 25	F 10	F 25	M 10	M 25	A 10	A 25	M 10	M 25		
SHIPPING REQ.		292	190		176		176		176		176		174			
ASSEMBLY SCRAP		24	4		2		4									2
A 1812	~~281~~															
	278	278														
A 1872	~~448~~															
	446	38	194		178		36									
A 2013	502						144		176		176		6			3
		Bracket											RP 1805			

FRONT AND REVERSE of single form enable Solar to meet complex requirements of scheduling jet production in the face of design changes and withdrawals from production for experimental purposes

SINGLE FORM FOR CLOSE CONTROL

A SET OF REQUIREMENT RECORDS has been developed by Solar Aircraft Company, Des Moines, to meet the special problems of scheduling and production of assemblies for the "hot end" of jet aircraft engines. The system is described here because it may prove useful to other companies with similar conditions. These conditions are:

1. Final assembly operations generally proceed in a steady flow. Certain aspects of line production are present.

2. Subassembly and detailed part operations generally proceed on a job-lot basis, with one to three months' shipping requirements produced in one or two weeks.

3. Frequent changes in design, and correspondingly frequent changes in production techniques.

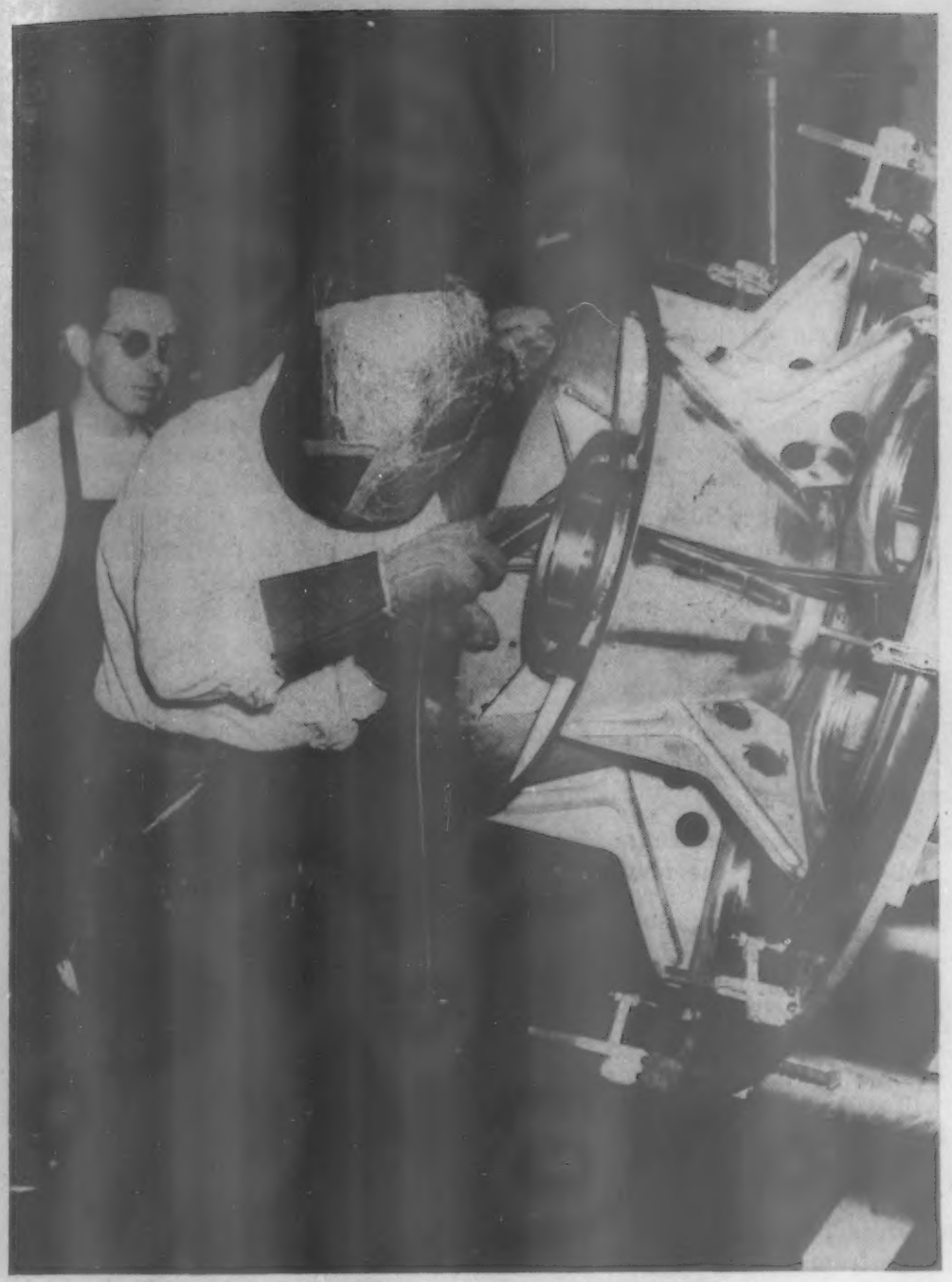
4. Frequent changes in schedule.

Two special problems result from these conditions:

1. The techniques for controlling line production cannot be applied to final assemblies, because changes in design and production techniques render it difficult to balance the lines or keep them in balance.

2. The usual techniques for machine loading (Gantt charts or various types of control-boards) are not generally applicable, because they become obsolete as fast as they are set up.

The typical manufacturing sequence at Solar goes something like this: Cut and form component parts from stainless steel sheets; machine other component parts from bar stock, castings, and forgings; assemble, generally by welding; assemble subassemblies into final assemblies, again by welding. Inspection, heat-treat, sandblast,



JET'S "HOT END" is key item in priority program for Air Force modernization. Simple but efficient control prevents costly delays

OF JET PRODUCTION

and burring operations are interspersed. Typical major assemblies contain 25 to 50 component parts and subassemblies.

Production and shipping schedules are fixed by the requirements of the customer, modified by tooling time, material procurement time, and production lead time. The primary job of the Solar production control organization is to provide proper quantities of parts to the assembly areas at the right time.

The only "paper" required for Solar's solution to these problems is a single card (two sides). One girl can keep the records up to date—in addition to performing other duties which include writing all manufacturing orders.

Calculation of shipping requirements is a simple matter. The process is illustrated on the requirement card shown on the facing page. Quantity per unit is listed in the upper left-hand corner; sales orders involved are listed separately, and the quantities shown are the quantities that result after the final assembly shipping requirements are multiplied by the quantity per unit. These requirements are broken down by months, and totaled at the bottom of the card. They represent the total known shipping requirements in accordance with the latest schedule.

On the back of the same card, performance against requirements is recorded. Total shipping requirements are brought forward from the face of the card, spread out by months. To this are added requirements for replacement of parts scrapped in assembly, and parts withdrawn from production for experimental use. The sum (shipping requirements plus assembly scrap) tells the planning department the number of parts required for each shipping month, without allowance for future scrap.

Lead June Estimates

Although the design changes and changes in production technique preclude the use of normal machine loading procedures, Solar has found that reasonably accurate estimates of lead time can be made.

For example: Press operations are fast, once the last press is set up. The entire order comes through in one lot. Welding and machining, on the other hand, are relatively slow, and part of the order will be completed each day for several days or several weeks. Thus, an overlap in time is permissible in instances where the first parts are normally completed long before the last parts on a given order; this overlap is not permissible where the parts normally are completed all in one lot.

Manufacturing orders are written in accordance with quantities and lead times, but at least two elements of judgment are required at this point:

1. Should the order be written to cover more than one month's requirements?

If no design changes are contemplated on the part in the immediate future, if die set-ups are involved, and if material is available, perhaps two or three months' requirements should be produced at one time.

2. How much should be allowed for future scrap and future experimental use?

If the past scrap has run, say, 5 per cent, and if the job is not approaching the end of the contract, it may be advisable to run 10 per cent more than required, to allow for any unexpected contingency. This procedure permits small changes in schedule to be made without additional press set-ups,

and permits the experimental department to withdraw production parts for rush experimental orders. If the parts are not scrapped or used for experimental purposes, they are applicable to the next month's production requirements; the only loss is the cost of carrying the small additional inventory.

Number and Quantity Listed

As each manufacturing order is written for the production of the part in question, the manufacturing order number and the quantity ordered are listed. The quantity ordered is spread out beneath the *total* requirements (including past scrap), so that it is quickly evident how far that order carries. When the order closes out, the quantity of *good* parts actually produced is entered below the quantity ordered.

Now suppose that something delays the close of one order, and a second order is written for the part before the first one closes out. Further, suppose that the first order closes out for some quantity other than the quantity ordered. It is then necessary to move the second order forward or backward on the card by the amount of the discrepancy, because it now covers a different portion of the shipping requirements. The quantities on the cards are laid out in pencil so such changes can be made by erasing.

Some scrap occurs in the initial fabrication of component parts. Strictly speaking, it is not necessary to post these rejections at all, because, when the order closes out, only net good parts are entered on the card. However, since it is sometimes useful to know how much scrap has occurred on a given order before it closes, such rejections are posted temporarily on the side of the card, opposite the manufacturing order; they are erased when the order closes.

A second type of scrap is more difficult to handle, and is more important from a requirement standpoint. Some component parts are spoiled in assembly. The requirements for these component parts are now higher than they were before, so the amount scrapped has to be added to the requirements for the current month. Since open manufacturing orders for these component parts no longer cover as much of the shipping requirements as they did before, it is necessary to move the orders back on the card (by the amount of the scrap).

Posting daily for every part scrapped would be something of a chore. Therefore, scrap is posted daily in a special block on the card, but it is not added into the current month's requirements until the quantity becomes significant.

Sometimes, of course, whole assemblies are scrapped, including component subassemblies and subsubassemblies. The procedure for posting remains unaltered; the assembly is broken down into its components and the requirements for those components are increased accordingly.

When a major change is made in the shipping schedule, the requirement records must be revised accordingly. This is done as follows:

1. The new shipping requirements are entered on the face of the card.

2. Totals are brought forward to the back of the card, month by month.

3. Open manufacturing orders are laid out against the new schedule.

For example, suppose that before the change in schedule, existing manufacturing orders carried production to within 5000 units of the end of the contract. *After* the change in schedule, those orders will still carry production to within 5000 units from the end of the contract. Consequently, after the new requirements are laid out by months, one simply backs up 5000 units from the end of the contract and shows existing orders against requirements prior to that point.

Old Card Filed

Ordinarily, when a schedule change is made, the old card is filed away and the new information is entered on a new card. This provides room for future manufacturing orders and also provides a permanent record justifying the orders written and material purchased, in the event of contract cutback or termination.

The clerical work in making a schedule change on a major assembly with, say, 50 component parts and subassemblies takes 3 to 4 manhours with skilled clerical help.

At the end of each month, when actual production of final assemblies differs from scheduled production by a small amount, the overage or delinquency is carried forward into the following month, and no entry on the cards is necessary. When major discrepancies occur, a change in shipping schedule is ordinarily required, with corresponding revisions on the cards.

Initially, production schedules were established to agree with the calendar month—that is, all final assemblies were planned in terms of a certain quantity by the end of each calendar month. Theoretically, this should have been all right, for detailed parts and subassemblies were planned to provide an even flow throughout the month. In practice, however, production supervision found it desirable in some instances to shift manpower from one job to another, with the result that most of the shipping was done near the end of the month.

In order to cure this end-of-the-month rush, production schedules were broken into three groups, each covering approximately one-third of the final assembly work of the plant. The first group was scheduled to run from the eleventh of each month to the tenth of the following month. The second group was scheduled to run from the twenty-first to the twentieth, and the third group from the first to the thirtieth. The advantages were mainly psychological, because an analysis of manufacturing orders under the old system showed that they were very nearly evenly distributed throughout the month before the change was made.

A Flexible System

Requirement records of the type described can be used either with or without machine loading. In companies where the operations are standardized and stable enough for machine loading to be utilized, the requirement records and lead times provide limits within which to work when shuffling machine loads. In companies where operations change too frequently to permit machine loading, or where shop difficulties (such as tooling problems) are an important factor, the requirement records are flexible enough to take such difficulties in stride, even though they lack the exacting accuracy of loading.

These requirement records have been in use at the Solar Des Moines plant for 2½ years. Operating details have been modified from time to time to provide the desired control, and lead times have been adjusted somewhat to correspond more accurately to actual manufacturing times. But the inherent flexibility of the basic system has proved its worth through many varying situations.

▶ **Many a good resolution to put plant maintenance on an efficient administrative basis stalls when it comes to developing suitable paperwork . . .**

▶ **Some paperwork systems boldly conceived finally bog down of their own weight and complexity. Others are discarded because they give only lip service through inadequate forms and routine . . .**

▶ **Here are the tested ingredients in a proved formula for a maintenance paperwork system that can be adapted to the limited needs of a small plant or expanded to the greater requirements of a large plant**

EFFICIENT ADMINISTRATION of plant maintenance requires paperwork. To deny this fact would contradict the proved value of paperwork in all other operations of the plant. To ignore it means rejection of a major management tool for cutting maintenance costs.

Admitting the point, then, how much paperwork shall it be? "We don't have time to fuss around with forms," says one plant engineer. "Our men are mechanics, not clerks," says another. "You can't set up a simple, workable system for such a complex range of maintenance duties," says a third. All of which simply outlines the problems faced in designing maintenance paperwork, but shuts its eyes to the overruling benefits of what paperwork can do.

Here is a paperwork system that has met the test of experience and won the favor of both management and the worker, not only in the maintenance department but also in the de-

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* This article was prepared while the author was chief plant engineer of Marathon Corporation, Menasha, Wis.

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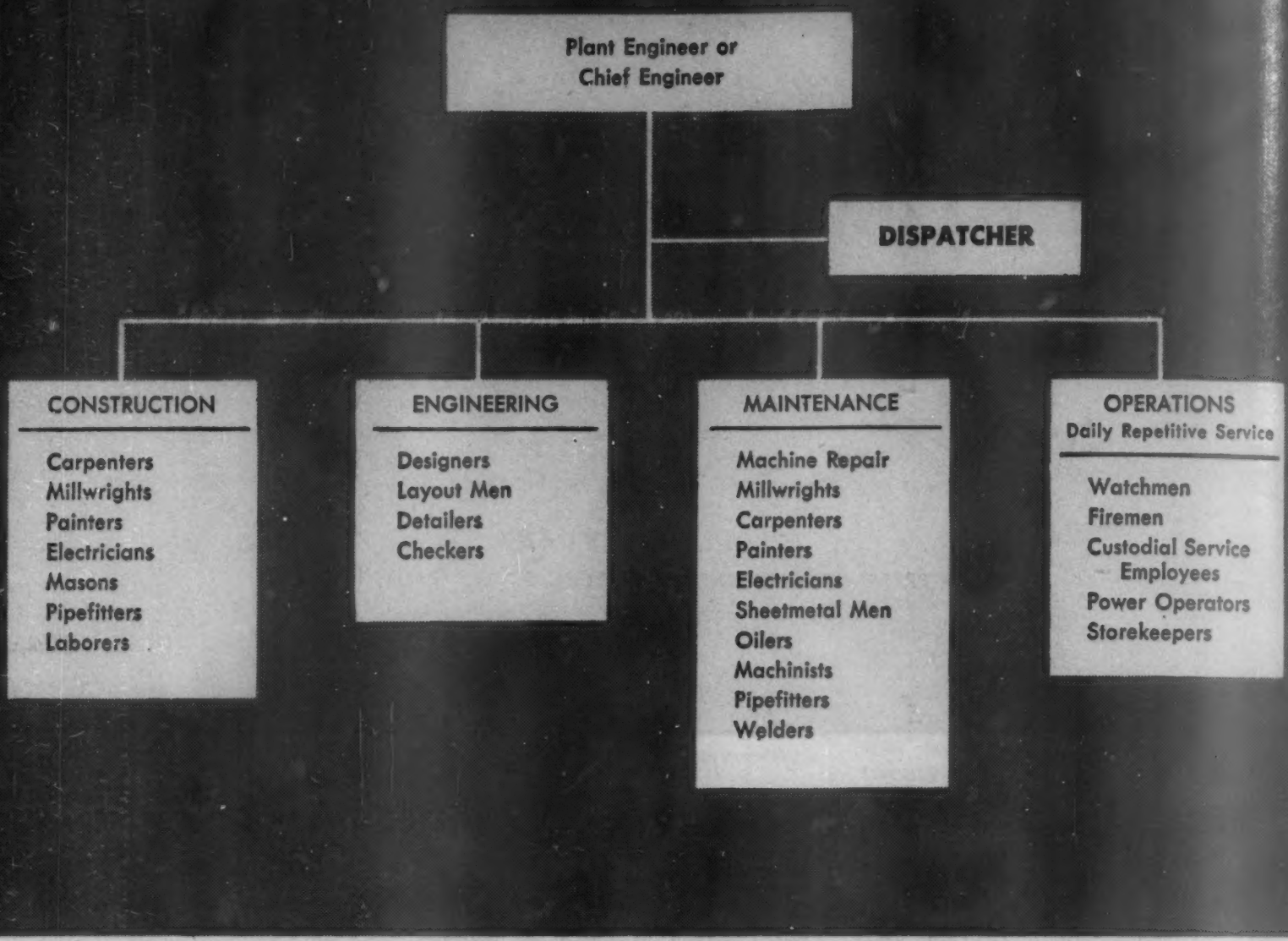


ORGANIZATION WITH SEPARATE DIVISIONS FOR CONSTRUCTION AND MAINTENANCE
The dispatcher is key to the smooth operation of this maintenance paperwork system. Whether or not the organization warrants a full-time man, he is indispensable for its proper administration

partments it serves. And only because it has made everybody's job *easier*. Add to that the benefits of scheduled work, defined responsibilities, smooth flow of work orders, and reduced costs through better control, and you have a vision of why it is worth while.

No paperwork system can be devised as a package to fit perfectly the needs of an individual plant. Different timekeeping methods, accounting systems, and special requirements prevent standardization of that kind. Obviously, this limitation applies to maintenance work as well as to production operations. The basic and motivating principles of every good system, however, as interpreted into various forms and routines to meet the circumstances, will be found substantially the same no matter what the industry. It is *why* forms exist, and *what* they do, that should receive the major scrutiny when studying any one system. Viewed in this light, the drab descriptions of format and routine of this or any system are seen as a means to an end. Thereupon paperwork no longer is stubbornly resisted as a time-consuming handicap, but rather welcomed as an indispensable tool for better performance of work, in faster time, and at lower cost.

Three steps to control. The following paperwork system is applicable to plants of all sizes. Small plants might find it possible to reduce the number of forms. Large plants might need to enlarge the detail on the forms, or supplement the forms with others to subdivide their scope. Regardless, the important thing is to have an integrated control over all work from the time each job is needed until it is satisfactorily completed.

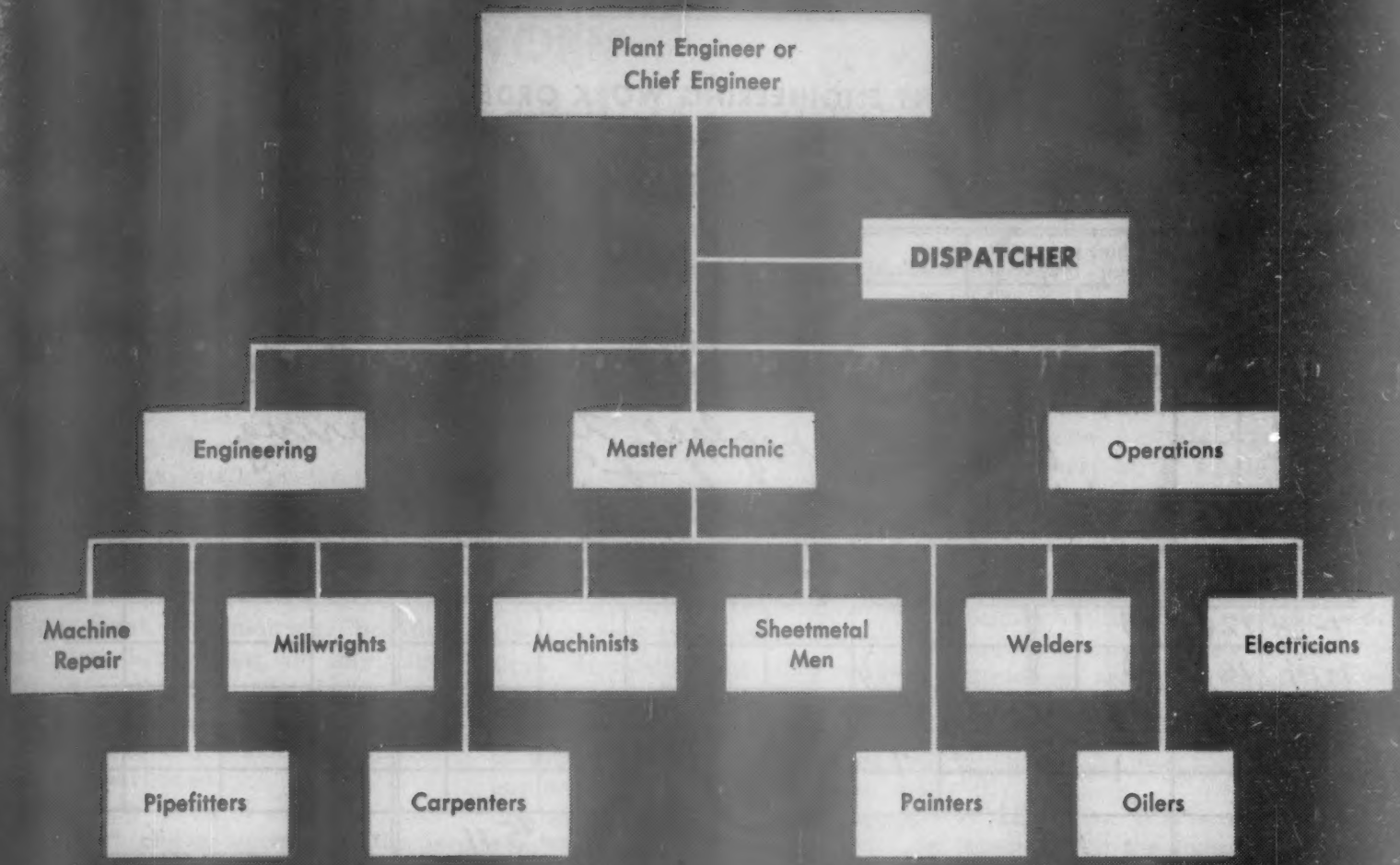
In manufacturing operations this control is obtained by production orders and control procedures of recognized merit. The same techniques can be used for plant maintenance, using simple forms for work orders, centralizing the control in a dispatcher, and recording the results on machine-and-equipment and building history cards. Thereby variations in both performance of work and costs are constantly being brought to light and remedied. This is the essence of good control.

The establishment of good maintenance control, however, is more than setting up a paperwork routine. It involves three related steps:

1. Organize the maintenance department with clearly marked lines of authority and responsibility from top management down to the newest apprentice or helper.

2. Integrate the organization for operation by a paperwork system, using forms and records to serve as authority for *all* moves.

3. Operate the department in all its relationships according to the rules of its organization and within the regulations of the control methods provided.



ORGANIZATION WHERE CONSTRUCTION IS NOT THE MAIN FACTOR

Staff relationship of the dispatcher to the maintenance executive is essential, regardless of the type of organization, if he is to fulfill his liaison duties effectively. All paperwork is channeled through him

1. PROPER ORGANIZATION

in which the duties of a dispatcher are vital to proper handling of paperwork

THIS ARTICLE NEEDS to emphasize only one important point on organization, relating to the position of a dispatcher, as pertinent to the proposed paperwork system.

The dispatcher's place in the organization is of a staff character regardless of the type of organization chosen.

The organization of a maintenance department can consist of separate divisions for construction and maintenance functions. In plants making continual improvements or changes, this is often the practice. In this case, it is best to separate the two functions (as shown on facing page) by a clear line of demarcation, each with its supervisory head, subordinate supervision, and personnel. This fixes responsibility and prevents neglect of the maintenance function.

Shown above is an organization chart of a maintenance department for a plant where construction work is not a major factor. Construction and maintenance functions are combined in one department.

There are, of course, cases where the plant is not large enough to support any separate crafts. The plant employing only a few general maintenance mechanics instead of separate trades or crafts is usually too small to warrant the installation and operation of the system to be described.

In both organization charts shown, note that the dispatcher reports directly to the operating head of the department. In the absence of a full-time dispatcher, his position may be filled by the plant engineer or any other individual designated by him.

The dispatcher is a key figure in the systematic regulation of construction and maintenance work. Requests for work to be done are channeled through his office. He issues all work orders to crew chiefs or group leaders of the trades and crafts of the construction and maintenance departments. After work is completed, work orders are returned to the dispatcher, who records the results, and cause of any failures, on the proper history card, and then forwards the work orders to the plant engineer for final processing. The smooth operation of the proposed paperwork system is predicated on the essentiality of the duties of a dispatcher in the maintenance organization. This point will become more apparent as the details of the system are unfolded.

CONTINUED ON NEXT PAGE

PLANT ENGINEERING WORK ORDER

ORDER NO. 1247 AUTH. NO. _____ DATE ISSUED 7/14/47 DATE WANTED 7/14/47

Acct. Classification		Machine Repair	Millwright	Machinist	Sheetmetal	Welder	Electrician	Pipefitter	Carpenter	Painter	Oiler	Bldg. Service
Acct. Type	20		✓									

Acct. Sub.	Labor	Mat'l	Requested by	Inventory No.	Name
	315	328	John Hanson	345	No. 1 Jordan

Division Plant
Division Factory
Department Major

Description

Repair or replace thrust bearing that is overheating

Date	Clock No.	Hours		Date	Clock No.	Hours		Date	Clock No.	Hours		Date	Clock No.	Hours	
7-14	128	3													
7-14	162	3													

Total Stores Cost $5.11 Total Hours 6

Issued by Ed Jones
Dispatcher

OTHER SIDE TO BE COMPLETED BY MECHANIC

Schedule Emergency

Description of work done Replaced with new babbitt. Checked bearing and found grooves too badly worn to scrape.

What caused this trouble (if repair work)? Load too heavy for old bearing. Seems to be some vibration off plug.

What can be done to prevent it from happening again? Put on roller bearings like we have on No. 2 Jordan.

Work completed Bob Smith SIGNATURE OF MECHANIC Date 7-14-47

Work Inspected Henry Brom SIGNATURE OF INSPECTOR Date 7-14-47

Work approved John Hanson SIGNATURE OF FOREMAN REQUESTING WORK Date 7-15-47

(RETURN THIS ORDER TO THE DISPATCHER IMMEDIATELY UPON COMPLETION OF WORK)

2. PROPER PAPERWORK

which records the details of every maintenance activity from start to finish

ONCE the maintenance department has been organized, the next step is to introduce the work order form as one of its important tools. The work order is always initiated by the dispatcher upon the request of any authorized person. This request is preferably telephoned, but may be handled by a written requisition. The dispatcher receives all requests for construction, maintenance, repair, rearrangement, engineering, building service, lubrication, or any other work confined within the policies, work rules, job descriptions, duties, and responsibilities of the engineering department.

Only in cases of extreme emergency should a work order be issued without complete information on the following:

1. Requester's name.

2. Inventory or unit number of the machine, equipment, or unit for which work is requested.

3. Location, name, and description of the machine, equipment, or unit for which work is requested.

4. Full description of the work to be done.

5. If the job is repair work, cause of the trouble.

6. Absolutely the *latest* time for which the job can be scheduled for completion.

The dispatcher receives all calls for plant engineering or maintenance service regardless of the cost of items involved. Together with the requester, he makes a preliminary estimate of the job, as far as this is possible at the time the request is made. Should it be determined that the cost will not exceed established limits permitted for capital expenditure, or for rearrangement, maintenance, or repair work, and does not involve any engineering, he issues the work order.

Special work. If the dispatcher determines, however, that a job will exceed work order cost limits, or involves any engineering, he refers it to the plant engineer, and immediately informs the requester of the action taken. Upon receipt of a request of this nature, the plant engineer reviews the request, surveys the job, and takes steps leading to final disposition of the request. These steps include performance of necessary engineering, assignment of project to staff members of the engineering department, and obtaining the expenditure authorization showing estimated cost.

Following such authorization the dispatcher issues a separate work order (see facing page) for each section, trade, or craft required to complete the request. For example, a job needing only electrical maintenance work requires a work order to be issued directly to the electrical section. A job involving more than one craft, such as rearranging a machine, may involve millwrights, electricians, and pipefitters. In this case, a separate work order is issued each craft.

In instances where one craft requests *minor* work to be done by another, such as the machine repair section requesting work by the welding section, the single work order is considered sufficient authority. In such instance, however, the welding section mechanic doing the work must enter his clock number and time on the work order issued to the machine repair section. This follows the rule that all labor must be properly accounted for by entries on work orders.

In cases where different crafts are involved, and more than one work order is issued for the same request, the first work order issued carries the primary number for the first craft. All subsequent work orders for other crafts needed for the same job are secondary work orders and carry the same number with the suffix "X."

This numbering system permits the plant accounting department to segregate and keep together all costs for a single job. A "job" is defined as a total amount of all work performed on one project for a machine, piece of equipment, or item carrying a single inventory number, or of general work for a department, or on a single building or any part thereof.

Where more than one inventory number is involved, separate work orders (with separate work order numbers) are issued for each inventory number. This is done to determine the cost accumulated against each separately accounted item.

Rush jobs. It is necessary to good control that the maintenance work be handled in a systematic manner. However, there are occasions when emergencies require the dispatcher to relay verbally the work order information, together with the work order number. In this way it is possible to get work going without the normal time lag in filling out the work order form and delivering it to the craftsman in accordance with the control-board procedure.

In cases of this kind, the dispatcher writes on the work order that it is a confirmation of the verbal order. He also notes the time and name of the craftsman to whom the verbal order was issued. The completion of the work order is then handled in the regular manner.

For purposes of this departure from routine, an "emergency" is defined as an imperative need (1) to restore immediately a machine or piece of equipment to production when production is interrupted by a machine or equipment failure, or (2) to remove immediately a safety hazard which has placed personnel or any part of the plant in jeopardy.

Transmitting the work order. Copies of the work order are distributed by the dispatcher as illustrated in the flow diagram on pages 102 and 103. The original (white) is usually issued to the crew chief of the section responsible for the work involved. There may be times, however, when a dispatcher will route the work order through the plant engineer or a member of

WORK ORDER FORM, FRONT AND BACK

FRONT (top). Simple yet comprehensive, this maintenance order omits none of the information that is needed in order to know what work is to be done, when, by which craft, and how to charge its cost

BACK (bottom). Report of work done by the draftsman includes diagnosis and remedy of the trouble, to prevent repetition of the need for repair

REPAIR AND MAINTENANCE HISTORY

Date Mo.	Da.	Yr.	W. O. No.	Labor Hours	Material Cost	Work Order Description
1	13	47	127	60	628 50	REFILL PLUG & SHELL
1	16	47	143	14	1 50	GRIND JORDAN
2	11	47	192	2	1 20	HOT BEARING
7	14	47	1247	6	5 11	REPLACE THRUST BEARING

Date Mo.	Da.	Yr.	W. O. No.	Labor Hours	Material Cost	Work Order Description

UNIT NO. 345

WEEK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
Mechanical						X						X					X						X						X						X						X						X				
Electrical	X		X				X				X				X				X				X				X				X				X				X				X				X				X	
Pipefitting						X						X					X						X						X						X						X						X					

MACHINE AND EQUIPMENT HISTORY CARD

CLASSIFICATIONS: NO. 1 JORDAN

MANUFACTURER: S. H. BLOW & SONS CO. (LITTLEFIELD, Mo.)

DESCRIPTION: 38" X 61" PLUG WITH PLAIN BABBITT BEARINGS

ACCESSORIES: 3/8" HEAT TREATED PLUG FILLING AND 1/4" SHELL SAND TRAP. CAST IRON BASE, CONCRETE FOUNDATION, PIN TYPE FLEXIBLE COUPLING, STEEL COUPLING GUARD, DRIVEN BY ALLIS-CHALMERS 200 HP 3-PHASE, 60-CYCLE, 440-VOLT, 435 R.P.M., SQUIRREL-CAGE MOTOR, INVENTORY NO. 346.

Date	Plant	Dept.	Bldg.	Floor
5-17	10	02	6	2

Date Purchased: 1917
P. O. Number: 16-4987
Cost: $6994.56
Installation Cost: $756.
Weight: 12,500
Floor Area: 42 SQ. FT.
Utilities Required:

Air	☐	Gas	☐
Water	☒	Volt.	440
Steam	☒	Amp.	235
Drain	☒	Phase	3
Wax	☐		

PREVENTIVE MAINTENANCE INSPECTION CHECKS

☐ Rolls	☒ Plumbing
☐ Drums	☐ Pulleys
☒ Bearings	☒ Motors
☐ Cams	☒ Controls
☒ Guards	
☒ Belts and Chains	
☐ Gears and Sprockets	

PREVENTIVE MAINTENANCE INSPECTIONS PERFORMED (Use letter M for Mechanical, E for Electrical, P for Pipefitting)

WEEK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
1947	E		E			M	E			E			E		M		E			E	M				E	M			E	M		E		M	E																	P
1948																																																						
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1951																																																						

ALLOWABLE INSPECTION TIME

TYPE	HOURS
Mechanical	2
Electrical	1/2
Pipefitting	1/2

MACHINE-AND-EQUIPMENT HISTORY CARD

FRONT (bottom). One card form for each machine serves dually as a data sheet and as a schedule for preventive maintenance inspections

BACK (top). History of repairs and maintenance on each machine is invaluable for comparison of maintenance costs and budget preparation

the engineering staff for consideration or review of some unusual aspects of the job.

The first copy (pink) is forwarded to the plant accounting department. The second copy (blue) is sent to the supervisor of the department from which the request was received. This copy serves to notify the supervisor that the work order has been issued, and is to be performed as indicated on the form. He places it in a current file until the job is completed. The third copy (yellow) is filed in the dispatcher's "active" file and held there pending the return of the completed original copy.

The crew chief then studies the requirements of the job, and when necessary consults with the depart-

REPAIR AND MAINTENANCE HISTORY

Date	Labor	Materials	Work Order Description
2-14-47	211	$ 407.00	PAINT INTERIOR OF BUILDING 2 COATS
3-6-47	4	00	REPAIR LOADING DOOR
4-21-47	12	8.60	REPAIR TRUCK LOADING DOCK
5-3-47	6	00	REPAIR LIGHTING PANEL
6-11-47	8	00	FLUSH OUT SPRINKLERS
6 28 47		210.06	REPAIR & MOP ROOF

BUILDING HISTORY CARD

DIVISION MENASHA BUILDING NO. 20 FILE NO. SHEET 1 OF 1
WAREHOUSE (WAX)

CONSTRUCTION ORDINARY - JOISTS AND GIRDERS

DESCRIPTION ONE STORY - FLOOR FOUR (4) FT ABOVE STREET GRADE
USAGE WAX PAPER STORAGE AND SHIPPING
BUILT 1927 BY C.R. MEYER & SONS, CONTRACTOR - MARATHON (ROMAN), ENGINEER

PHYSICAL PROPERTIES COMPOSITION ROOF, INSULATED, DRY SYSTEM SPRINKLER, MAPLE FINISH FLOORS, CORRUGATED IRON FROM GRADE TO FLOOR. LOADING PLATFORMS, SOUTH & WEST SIDES.

FLOOR	FLOOR Load Capacity	CEILING Clearance	AREA in Square Feet	VOLUME in Cubic Feet	BAY Size	
BASEMENT NONE						
FIRST FLOOR	175	9-22	14,000	224,000	16 X 16	
SECOND FLOOR NONE						
THIRD FLOOR NONE						
FOURTH FLOOR NONE						

HEATING NONE

VENTILATION NONE EXCEPT DOORS - NO WINDOWS

LIGHTING 100 WATT RLM 16 FT. CENTERS 7 F.C.

MAINTENANCE INSPECTIONS PERFORMED

WEEK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
1947				X																														X																		
1948																																																					
1949																																																				
1950																																																				
1951																																																				

BUILDING HISTORY CARD

FRONT (bottom). Centralization of building construction data for each building gives quick answers to preliminary plant layout questions

BACK (top). History and accumulated costs of building maintenance keep maintenance executives informed of the serviceability of all features

ment supervisor, the master mechanic, a staff member of the engineering department, or the plant engineer. He also secures necessary prints of drawings, checks for availability of material, initiates the necessary material requisitions, and determines tentatively the number of man-hours required to complete the job.

The plant engineer holds daily "schedule" meetings attended by all crew chiefs and affected members of the staff of the engineering department. These daily meetings are for the purpose of scheduling work orders which have been issued and are now to be fitted into the activity program for the time when each job is requested. It is, of course, not necessary to schedule

small or routine jobs, but all major jobs must be scheduled to meet the requirements of the work order and to balance available man-hour capacity to the best advantage.

After the requirements of the job are known, the necessary preliminary work is completed, and the work order is fitted into an approved schedule for each participating craft.

Following up the work order. Provision of a job-assignment chalkboard will help considerably to control all maintenance work in the plant. It serves two purposes:

1. Maintenance men are lined up to show what they are working on.

2. Jobs are lined up, in order of importance, to show the work load.

As a result, efficient and quick maintenance service is always obtained. A check of the job-assignment board will tell where any craftsman is at any time.

Description. Layout of a typical job-assignment board is illustrated in the photograph on page 104. Ths board, about 3½x5 feet in size, is best located on a wall of the maintenance shop. It lists in order of seniority the name of every worker, under his craft subdivision, such as machine repair, electrical, pipefitter, millwright, carpenter, painter, building service, welder, and oiler. Workers' nameplates are hung on hooks in the "name column" for easy rearrangement. Alongside each name, in the "order number" column, is a space for chalk entry of the work order number on which every man is working.

Three pockets are provided at the bottom of the board to hold work orders of each maintenance trade. The first pocket, starting at the back, is for "pending" work. The second is for "current" work in progress, and the last for all jobs "completed" that day.

How control board works. New work orders are placed several times daily in the "pending" pocket by the dispatcher, and arranged according to order of importance. When a worker completes one job, he must take the order first in line in his craft "pending" pocket.

The control board operates by self-supervision of each craftsman, and eliminates waiting for assignment from the supervisors. Each craftsman is responsible for posting to the board the order number on which he is working. Also, he moves the work orders from one pocket to another as the work assignments are taken and completed.

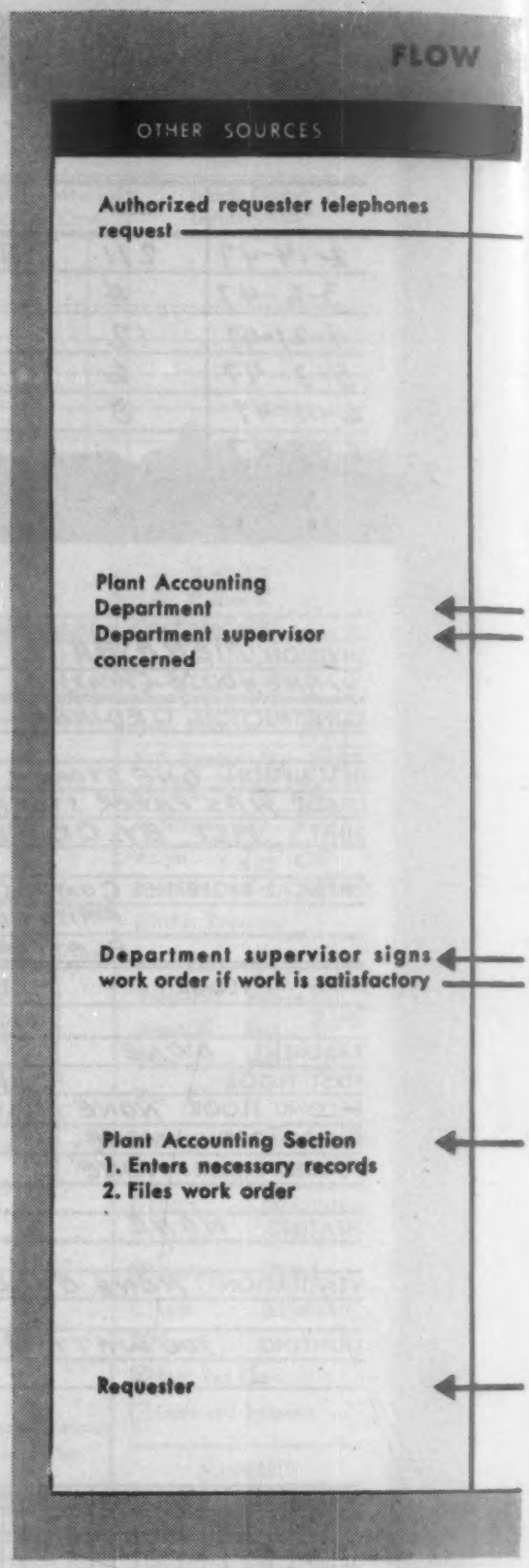
To learn where a worker can be found, anyone can get from the chalkboard the order number opposite his name. Then by consulting the "current" file, he can determine the details of the job. Supervisors can tell at a glance the nature of the work load, and be guided in their planning accordingly.

A similar but smaller chalkboard can be used effectively for supervisors. This board lists each supervisor's name and has a space where he must enter his whereabouts whenever leaving the office.

Where a "self-operating" control board is not feasible, because of size of plant or number of craftsmen, the dispatcher needs an assignment rack (see page 105) in which to place outgoing orders. This rack has separate partitions for distribution of new orders and collection of completed orders to and from each crew chief or foreman. Under this arrangement scheduling of work may be done by the crew chiefs according to the "date wanted" and as decided upon in the aforementioned daily schedule meetings. Whichever order distribution method is used, the flow of the work order is identical.

Multi-shift jobs. Work orders that take more than one shift to complete have the time entered thereon for all craftsmen who worked on the job during the shift, and are placed in the "current" box at the control board during the last 15 minutes of the shift. The dispatcher "takes off" the time and returns the work order to the "current" file within two hours after the beginning of the next shift. The crew chief picks up the work order during the next shift, and repeats this process if the job carries over to another shift.

Whether or not work orders take more than a day for completion, the dispatcher collects all outstanding work orders at the close of each day, and together with the completed orders he transcribes from them a summary time report for that day. This report shows the work order numbers, number of hours worked, and authorization numbers for each employee in the maintenance department. The dispatcher returns the uncompleted work orders to the sectional crew chiefs, inspectors, or craftsmen

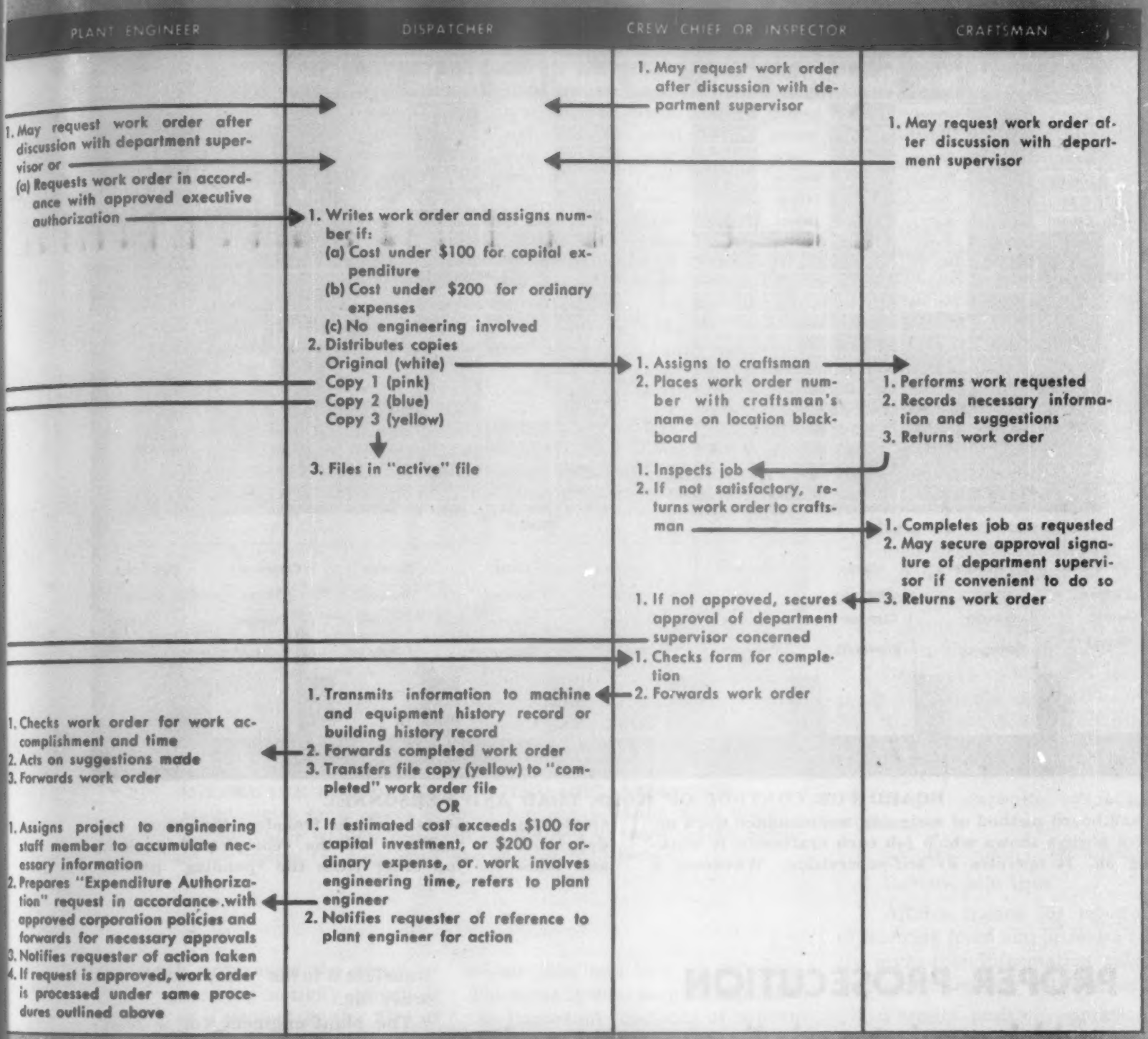


Origin and flow of every maintenance work order are governed by

from whom they were received. The daily time report is forwarded to the plant accounting department early the following day.

Completing the work order. After the job is completed, the craftsman (or craftsmen) who performed the work fills in the obverse side of the work order. Besides a description of the work done, the workman states the cause of the trouble, if the job is repair work. He also

DIAGRAM FOR MAINTENANCE WORK ORDERS


PLANT ENGINEER
DISPATCHER
CREW CHIEF OR INSPECTOR
CRAFTSMAN
1. May request work order after discussion with department supervisor
1. May request work order after discussion with department supervisor or
(a) Requests work order in accordance with approved executive authorization
1. May request work order after discussion with department supervisor
1. Writes work order and assigns number if:
(a) Cost under $100 for capital expenditure
(b) Cost under $200 for ordinary expenses
(c) No engineering involved
2. Distributes copies
Original (white)
Copy 1 (pink)
Copy 2 (blue)
Copy 3 (yellow)
3. Files in "active" file
1. Assigns to craftsman
2. Places work order number with craftsman's name on location blackboard
1. Performs work requested
2. Records necessary information and suggestions
3. Returns work order
1. Inspects job
2. If not satisfactory, returns work order to craftsman
1. Completes job as requested
2. May secure approval signature of department supervisor if convenient to do so
3. Returns work order
1. If not approved, secures approval of department supervisor concerned
1. Checks form for completion
2. Forwards work order
1. Transmits information to machine and equipment history record or building history record
2. Forwards completed work order
3. Transfers file copy (yellow) to "completed" work order file
OR
1. If estimated cost exceeds $100 for capital investment, or $200 for ordinary expense, or work involves engineering time, refers to plant engineer
2. Notifies requester of reference to plant engineer for action
1. Checks work order for work accomplishment and time
2. Acts on suggestions made
3. Forwards work order
1. Assigns project to engineering staff member to accumulate necessary information
2. Prepares "Expenditure Authorization" request in accordance with approved corporation policies and forwards for necessary approvals
3. Notifies requester of action taken
4. If request is approved, work order is processed under same procedures outlined above

a clear, definite procedure that is essential to efficient operation of a paperwork system. It provides integrated checks and balances which place responsibility for each step and allow effective over-all control

records any suggestions on what can be done to prevent the trouble from occurring again.

When it is convenient for any member of the crew that has worked on the job to do so, he secures signature of the department supervisor for whom the work was done. When this is not convenient, it is done by the crew chief or inspector. The original work order form is returned to the crew chief.

When the work order form is presented for signature, the department supervisor has an opportunity to check the hours charged to the job as listed on the front side. From this check he may transcribe the number of hours to his own blue copy of the work order form which he can place in a permanent file in his own office.

If the job is not satisfactory, either in quality of workmanship or failure to do work required, or if the number of hours charged to the job seems excessive, the department supervisor withholds his approval signature and informs the craftsman or crew chief of the reasons for doing so. After the requirements of the work order have been satisfactorily met, the supervisor signs the work order as indicated above. The completed work order form is then placed in the "completed" box at the control board for pick-up by the dispatcher at the end of the shift.

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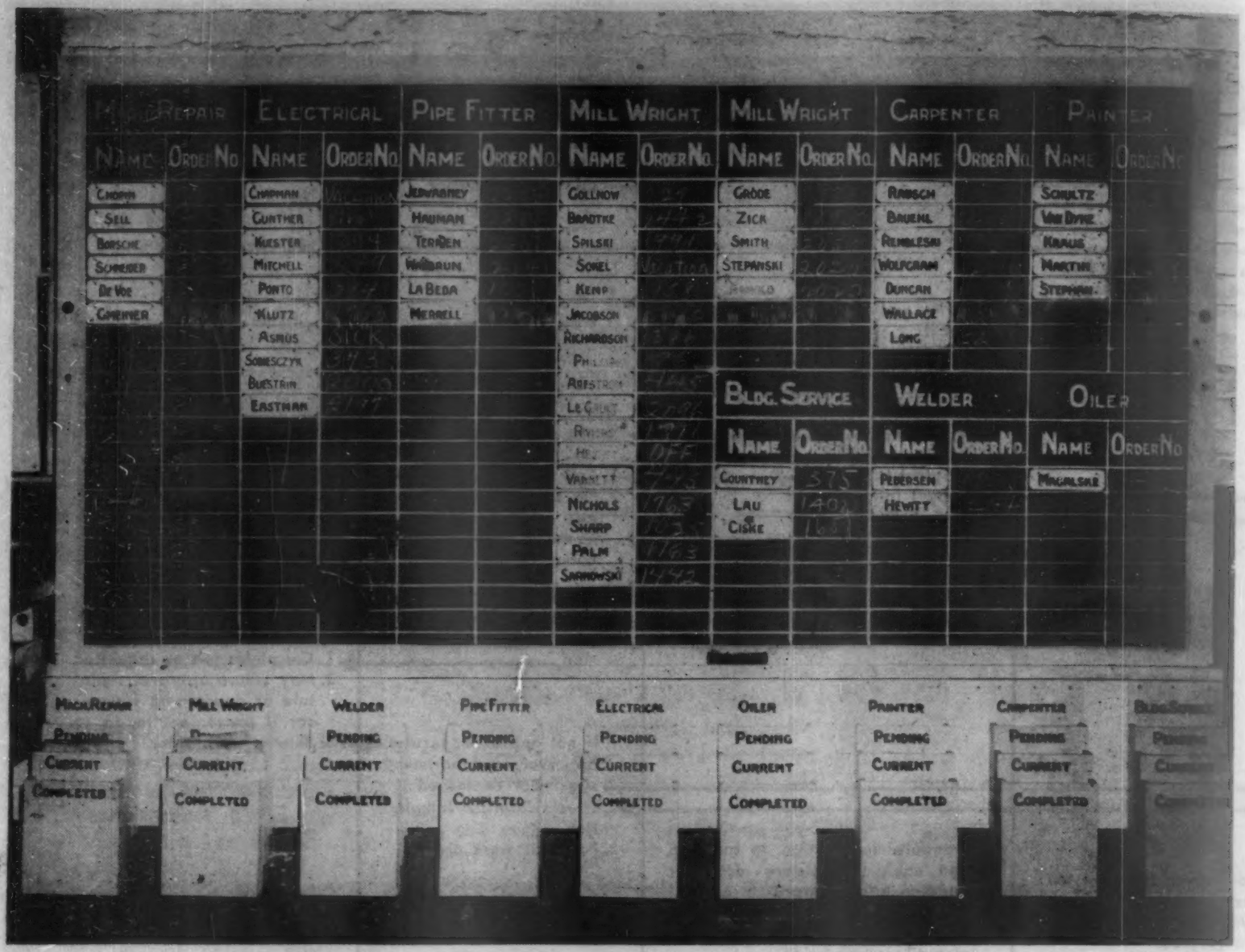


BOARD FOR CONTROL OF WORK LOAD AND PERSONNEL

Chalkboard method of assigning maintenance work orders always shows which job each craftsman is working on. It operates by self-supervision. Whenever a craftsman completes a job, he transfers that work order from the "current" to the "completed" pocket, and takes the top order from the "pending" pocket

3. PROPER PROSECUTION

which requires periodic executive review of work performance and historical data

IT WOULD be a big mistake to stop all maintenance paperwork at the completion of each job. The advantages of accumulation of cost and performance data from work orders for executive review are too valuable to overlook. It is necessary to watch the score to know how well or poorly the team is playing. Here is how the dispatcher keeps that score.

After checking the completed work orders for proper execution, the dispatcher transfers the information from each work order to the obverse side of the machine-and-equipment history card (see page 100) or the building history record (see page 101) in accordance with the description of the work requested and performed. He enters the total number of hours involved on the separate history card kept for each machine, piece of equipment, or other item carrying an inventory number. The building history record is cataloged by the number of building and location, such as floor, bay, and so forth. After completing these historical entries the dispatcher forwards the original copy of the work order form to the plant engineer, removes the third copy (yellow) from his "active" file, and transfers it to his "completed" work order file.

The plant engineer (or a designated member of the staff) then reviews the completed work order forms. He checks the total number of man-hours against the work performed, as a general measure of the effectiveness of the engineering or maintenance department. He also notes the suggestions entered on the obverse side for possible action to be taken. This action may be in the form of a field survey, engineering design, issuance of another work order as a follow-up, or preparation of an expenditure authorization (if he feels this is justified to carry out the suggestion).

If the work order was covered by an authorization number instead of a routine repair account classification, the plant engineer checks his project records, and records the work done. He may also do this if

ALTERNATE FOR DECENTRALIZED ORGANIZATIONS
Where maintenance crew chiefs or craft foremen schedule work assignments, a dispatching window can regulate the flow of work orders. Separate slots for orders for each craft are open at both ends

the work order was the result of any engineering activity which is carried as a project in the files of the engineering department.

Upon the completion of this check (which takes only a few minutes for the average number of work orders completed in one day), the plant engineer forwards the completed white work orders to the plant accounting department for their disposition.

Periodically the plant engineer also audits the machine-and-equipment history cards and the building history records to check the frequency and cost of the construction and maintenance items accumulating against machinery, equipment, and buildings. Benefits derived from this type of audit are obvious.

Preventive maintenance. Up to this point the emphasis of the routine of work orders has been on repair jobs and new construction. The same system may be applied to the important functions of preventive maintenance as carried out in periodic inspections, lubrication, or other types of servicing. The regular work order form is used in the same way, for specifying what work is to be done and recording its completion.

Instead of originating from requests from department supervisors, however, the preventive maintenance orders are taken from the equipment and building history cards (see pages 100 and 101) which schedule the type and frequency of attention needed. Likewise, the completion of such work is marked on these cards as a check against performance. Once the preventive maintenance schedules and requirements have been determined by the plant engineer for all plant machinery, equipment, and service facilities, the dispatcher takes over the responsibility of reviewing the cards and issuing and following up the orders. For convenience in scheduling, the cards can be marked with tabs or color-coded to show the periodicity.

SUMMARY. The method of handling maintenance work described herein performs 12 essential "services" for management. And it performs them with a minimum of paperwork and red tape.

Briefly, here are the features or "services" which this system offers:

1. Eliminates costly confusion of having more than one order or request issued for the same job.

2. Avoids misunderstandings, garbled instructions, failure of orders to reach proper craftsmen in time for prompt repair, and other costly, time-consuming mistakes resulting in unauthorized or ill-informed persons requesting work to be done without use of proper channels.

3. Affords an immediate means by which department supervisors can check costs of each job, and imposes reasonable limits of control for the supervisors to assist the plant engineering department in maintaining better efficiency.

4. Helps expedite emergency work.

5. Secures quality workmanship.

6. Reveals idle time.

7. Affords means for scheduling of working force and provides readily accessible information relative to the maintenance of this schedule.

8. Permits positive operation of any type of preventive maintenance program.

9. Maintains knowledge of current distribution and location of all members of the maintenance department for immediate availability for emergency.

10. Records cost of construction and maintenance for determining operating costs of fixed assets, provides accurate comparative costs for future estimates, and makes cost information available for more adequate budgeting figures.

11. Permits cost of construction and maintenance to be controlled by each job instead of solely by periodic averages.

12. Makes available to the maintenance supervisor a source of practical information of job experience.

BLOW-UP of circuit diagram saves time wasted while instructor draws on blackboard. Instructor can explain chart and supervise class at same time. And, of course, chart can be used over and over

HINTS FOR PLANT MEN WHO TEACH

W. C. VAN CLEAF • DIRECTOR OF INDUSTRIAL RELATIONS, ALLIS-CHALMERS MANUFACTURING COMPANY, MILWAUKEE

SEVERAL VERY SIMPLE teaching techniques are available to plant men faced with the problem of conducting industrial training courses. There are three methods of presentation—uninterrupted lecture, illustration, and use of working models that students can see and operate. Obviously, the last method is the most effective. At Allis-Chalmers, every possible application of this method is being made, even in the difficult field of practical engineering instruction.

Ordinarily, instructors are picked according to their technical abilities rather than their aptitude for teaching. However, inexperience in instructional methods can be overcome by employing simple tricks and educational aids to stimulate class interest.

Preparation. Probably the most important prerequisite to a successful class is extensive preparation. After studying his material thoroughly and rehearsing the delivery of it, poise and confidence come to the instructor naturally.

Timing the presentation precludes the possibility of having to omit important material because the class period ends before the delivery is completed.

Knowledge of the subject also makes the use of extensive notes unnecessary and helps in gaining the confidence of the students.

WORKING MODELS (top, Ward-Leonard drive; directly above, Kingsbury thrust bearing) help students grasp the why's and wherefore's

Demonstration. Training aids, used to good advantage in practically all fields, are especially valuable in "putting over" technical subjects. They can accomplish in a few minutes what might take hours of ordinary oral instruction. Use in just one class usually justifies any time and money spent in their development.

For example, in instructing student engineers in the "mysteries" of the Ward-Leonard variable speed drive, a simple working model cut lecture time from 2 hours to 15 minutes—a time saving worth $85 per course. In addition, student interest was increased, and actually "seeing the wheels go round" resulted in a better understanding of the operational principles.

A variation of the working model technique can be employed when discussing smaller devices. Explanation of the Kingsbury type thrust bearing was made effective by obtaining a model that could be passed around and operated by the students themselves.

Illustration. In many instances, blackboard drawings are time-consuming and inadequate.

An effective substitute is a chart, preferably drawn to a large scale and simplified as much as possible. Once prepared, it can be used over and over again, saving the instructor repeated work at the blackboard. More important, he does not have to turn his back on the class.

Participation. Any lecture course can be brightened by student participation. Such activities as problems, examinations, and inspection trips are excellent means of keeping class interest high.

One successful method consists of presenting a complicated problem to groups of four or five students. After they have been allowed to work on it for several hours, each group must "sell" its solution to experienced engineers.

Another form of participation is the student-delivered lecture. A given topic is divided among the students, and, after a period for preparation, each gives a short talk on his own assignment.

Tricks of the trade. During the class, an instructor can frequently employ several tricks to keep his class on its toes.

Familiarity with the names of at least a few of his students enables the lecturer to keep everyone alert, because no one knows when he will be called upon by name to answer a question. The monotony of a lecture can be broken up by such simple questions as, "Do I make myself clear, Jones?"

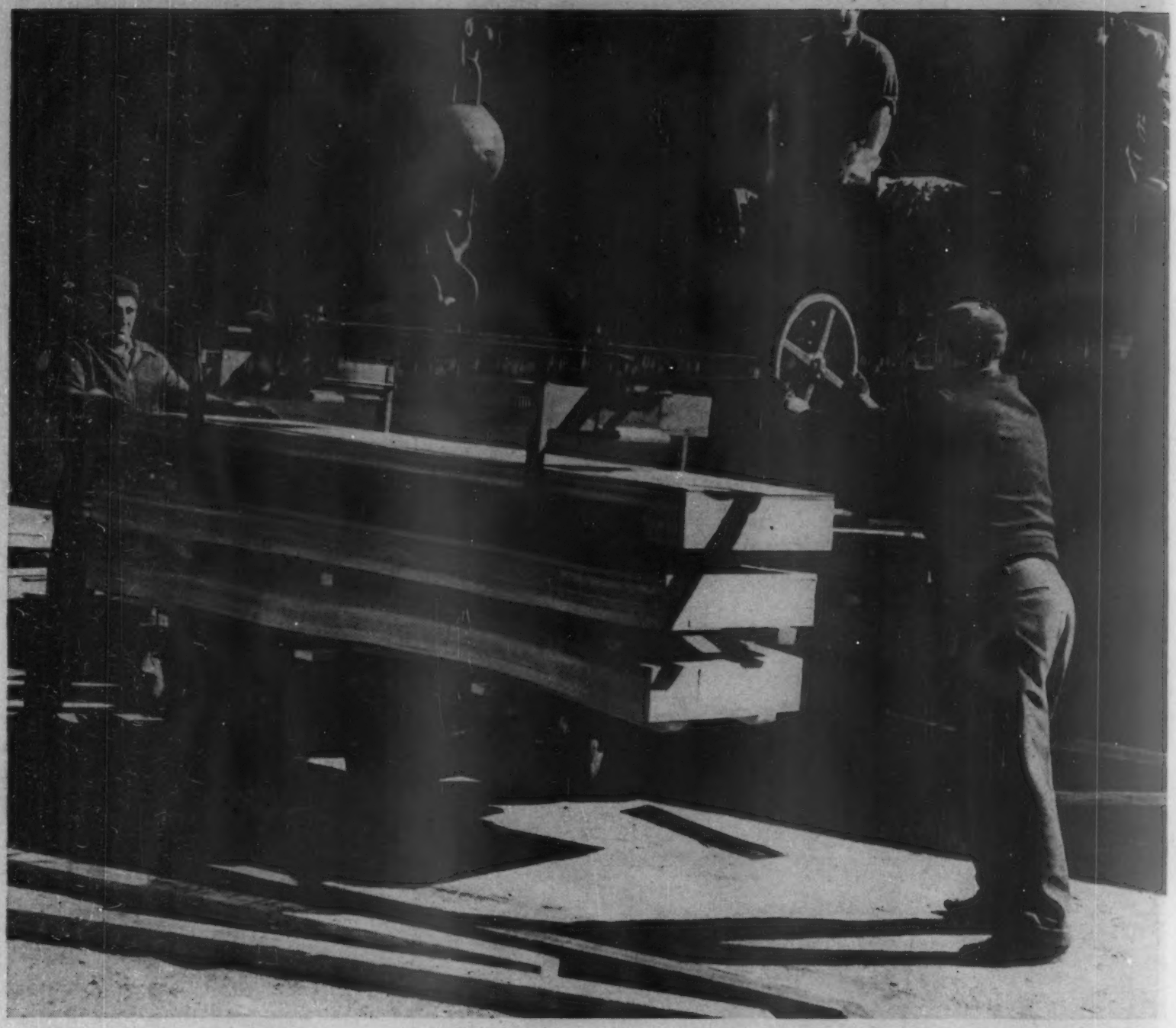
Stories to illustrate dull points often help. One of the dullest topics in discussing machinery manufacturing seems to be standardization. Interest in this subject has been held by telling anecdotes about personalties serving on standardization committees.

Directed discussion is useful in maintaining attentiveness and often brings up points that might otherwise be overlooked. It can be started easily by a few well-selected questions. A question to which there is no definite answer is especially suitable; questions that can be answered with one word are poor.

Once discussion is started, the instructor must keep it going in the right direction.

Oral quizzes and short written tests covering important points just mentioned keep up student interest. If students know in advance that they are to be tested, they will pay extra attention to the material being presented. Furthermore, quizzes indicate to the instructor which points are being grasped and which are not, thus giving him a good basis for reorganizing his lectures.

In all cases of class participation, it is important that students be graded on their performance. When they know that they will be marked, they put forth their best efforts.



SHEET STEEL shipments are made in gondola or flat cars, in standard bundles made up of 4000-lb. multiple lifts. Unloading an 80,000-lb. carload costs $20. The old manual method cost $50 per car

STANDARD PALLETIZED LOADS

ROYCE M. COVERT • SUPERVISOR, RECEIVING, STORES, AND TRANSPORTATION
WESTINGHOUSE ELECTRIC CORP., EAST SPRINGFIELD, MASS.

GREAT SAVINGS in the cost of handling material are foreseen by the management at Westinghouse East Springfield Works; its long-range improvement program is already showing savings of $0.61 a ton in the receiving department alone.

Analysis of the receiving department cost, made with the cooperation of purchasing and traffic and other related departments, showed the cost to be $19,592 for handling 8002 tons—$2.44 per ton. With the introduction of new handling techniques the cost dropped to $12,938 for 7058 tons five months later. The present cost per ton is therefore $1.83.

The present cost per ton handled is broken down in the categories shown in the table (right). It embraces all types of incoming materials, including carload and lcl receipts, parcel post, and express.

HANDLING COST PER TON OF MATERIALS

Wages—labor	$1.45
Salaries—supervisors and office personnel	.26
Repairs to equipment	.03
Crane service	.02
Expense purchases	.02
Miscellaneous expense—bracing, blocking, etc.	.04
Telephone, telegraph, stationery	.01
Total	**$1.83**

PANELS used to be received in truck loads, cost $45 to unload. Now one type is loaded in units of 100 per crate, another type banded in bundles of 2000 pounds per pallet—and unloading costs are $3

MAKE LARGE SAVINGS

The analysis was made with the idea of getting first at those costs where the greatest dollar savings were apparent, and then by subjecting the remaining costs to a close scrutiny in order to determine whether or not further expenditure for materials handling equipment and new packaging techniques was justified.

As each material was analyzed many factors were considered; for example, possible elimination of the item; and conversely, possible increase in quantities required. By considering these factors beforehand we were reasonably sure that money was not being spent for improvements that, in a short time, would be useless or inadequate.

In receiving raw material and bought components, the following major items were the first to be analyzed and methodized: Zinc alloy ingots, steel of all types, and vendor processed panels.

By working closely with our suppliers, a program was instituted whereby these items would be shipped to us in standard-quantity, palletized lots. Receiving these items in this manner has minimized handling in the receiving department and the stores areas; and it facilitates issues to manufacturing.

Case examples follow:

Zinc alloy ingots. Our first experiment was with zinc alloy ingots which are received in carloads. Previously this alloy was received loose in the car in 80,000-lb. lots, requiring handling of each ingot by hand at a cost of $52 per car. Now we receive the ingots in units of 2000 pounds each on a zinc pallet. It costs us only $4 for mechanized unloading and thus represents a saving of $48 per car.

The zinc pallets eliminate the cost of furnishing wood or steel

pallets and their subsequent return to the point of use, since the pallet goes into the furnace with its load. In all cases where the supplier has furnished palletized loads, the cost to us has been negligible. It has, however, been taken into consideration in our calculations.

Steel of all types. Next to be analyzed were the facilities for unloading carloads of sheet steel. The old method required hand unloading at an average cost of $50 per car. Shipments now are made in gondola or flatcars, in standard bundles made up of multiple lifts with a maximum of 4000 pounds per lift. We now unload an 80,000-lb. car in three hours for approximately $20. We save $30 per car.

To unload 150-lb. steel coils under the old method, a 20,000-lb. lot required 10 man-hours. By receiving the coils in 2000-lb. units on pallets we are able to unload a 25,000-lb. load in one man-hour.

Based on our average usage of steel per month, and at the above rates, an annual saving of nearly $10,000 is effected.

Vendor processed panels. Our next effort was directed to vendor processed panels which were received in truck loads. By having one type of panel loaded in units of 100 per crate, and another type banded in bundles of 2000 pounds per pallet, unloading labor costs were reduced from $45 to $3 per truck, saving $42 on each load.

Previously it required three men to unload a 500-lb. box of evaporator sheets from a truck. A 20,000-lb. load required six man-hours for unloading. With a new unit package containing 1600 pounds we can unload 20,000 pounds in one man-hour.

Handling equipment. Once material has been received, two things are immediately considered: (1) Is the material to be short hauled? (2) Will it be a long haul to point of storage or use?

If the material is short hauled or stored adjacent to the unloading dock, an appropriate type of handling equipment is assigned to carry out the task.

When the material is to be long hauled and the quantity warrants it, a trailer train is made up. Six or more trailers can be handled in a fraction more time than is required to move one pallet load on the prongs of a fork truck. In one application a six-trailer train pulled by a gas-powered truck was moved, unloaded, and returned to the point of origin in less than 30 minutes, compared to two hours formerly required when the load was handled in individual trips.

Dispatching of handling equipment. A central dispatching office has been installed adjacent to the electric truck charging stands. All calls for truck service are received at this point. The trucks then are routed by the dispatcher in such a manner as to complete the important calls first, and the balance in the order received.

Handling equipment maintenance. A preventive maintenance program has been started whereby each unit of the truck fleet has been scheduled for periodic inspection and greasing. This program provides for checking all trucks once every two weeks. Older trucks are scheduled for additional weekly inspections because their condition requires more frequent care, especially in the winter season.

A bulletin board is used to list each truck and its scheduled date for this inspection and greasing. This board is maintained by the dispatcher and is located on the wall in his office.

In addition to the dollar savings listed in conjunction with the various materials handled, a summarization of our collective efforts shows the following results:

1. Inbound demurrage entirely eliminated.
2. Quantity and quality inspection facilitated at receiving.
3. Record keeping simplified.
4. Handling of individual pieces minimized.
5. Materials moved to storage in unit loads.
6. Receiving area less congested.
7. Housekeeping much improved.
8. Time lost hunting material eliminated.
9. Unloading performed inside—unnecessary to go outside in inclement weather.

Although the above savings cover only the receiving department, other savings also are reflected in stores handling, intra-processes, etc. Based on these attained results, we feel that the expansion of this materials handling program into all phases of our business is amply warranted.

TRAILER TRAINS are made up when materials are to be long hauled, and the quantity warrants it. Six or more trailers can be handled in a fraction more time than is needed to move one pallet on a fork truck

VENTILATING THE LOCKER ROOM

WARD A. RING • TREASURER AND PLANT MANAGER, WOODWARD GOVERNOR COMPANY, ROCKFORD, ILL.

AIR IN THE MEN'S LOCKER ROOM at Woodward Governor is always fresh and sweet. Even the 680 individual steel lockers are air-conditioned. That is just one more service that keeps employee morale high.

Things were planned that way when the new locker room was designed. All lockers in the room are located in double rows, back to back. Lockers are set about 8 inches above floor level on terrazzo bases.

Immediately beneath the lockers are the completely enclosed exhaust ducts for the system. They extend 8 inches below floor level. Air enters the room through ceiling diffusers and passes through louvers in the tops of locker doors. Air is exhausted from the lockers by drawing it through holes in the locker bottoms. It then passes through the sub-floor duct system and on to the conditioning equipment.

LIGHTED CANDLE indicates flow of air through locker to floor ducts

The terrazzo floor curves upward to form the locker bases. This permits easy and proper cleaning of the floor and prevents the possibility of dirt accumulating underneath lockers.

There are certain distinct advantages to this system of air circulation. They include a constant change of air, complete elimination of odors common to a locker room, and rapid and automatic drying of damp clothing hung in lockers.

As a result, employees change into dry clothing, free of odors, in a room that is clean, bright, and well supplied with good air.

17 WAYS TO REDUCE THE COST OF FIRE INSURANCE

J. R. DeHAVEN • ASSISTANT SECRETARY, EMPLOYERS MUTUAL FIRE INSURANCE COMPANY, WAUSAU, WIS.

ELIMINATE KNOWN FIRE HAZARDS. Control factors that contribute to the spread of a fire in industrial plants. These are the only means by which high insurance rates and large fire losses can be reduced.

The known hazards in manufacturing plants are non-standard electrical wiring; painting and paint drying operations; heat-treating; oil quench tanks; cutting oils used in machining operations; lack of approved containers for oily or greasy rags; improper storage of flammable liquids; welding; open flame processes; friction from belts or other moving parts; excessive storage of combustible materials; and poor housekeeping. All of these conditions must be taken into consideration as causative as well as contributive factors in plant fires.

In greater or lesser degree, most of these hazards are found in the average industrial plant. The first step in obtaining freedom from the dangers they present, as well as a lower insurance rate, is recognition that they do exist and cooperation with a qualified fire protection engineer to have them eliminated.

Prevention of contingent losses from permanent or partial shutdown, involving loss of key employees and orders, will swell the tangible savings that such a program can bring.

Here is what can be done to eliminate or minimize some of the potential fire hazards that may cost money as long as they continue to exist.

1. Make Sure That Wiring Is Safe • All electrical wiring should be installed in accordance with the National Electrical Code. This is a standard of the National Board of Fire Underwriters. Most municipal authorities require strict adherence to this Code in construction involving new wiring. Contracts for additional wiring should provide for compliance with the Code.

Use of slipshod or makeshift wiring for extensions, non-standard splicing, or poor supporting of wires should never be condoned.

2. Isolate Paint-Spraying or Brushing Operations • Confine all paint spraying or brushing, other than occasional minor jobs, to a specially built enclosure or booth. Lack of adequate ventilation, coupled with poor housekeeping and unsafe installation of electrical equipment, is the chief cause of flash fires in connection with spray painting. A 20-ft. radius from the enclosure containing operations of this nature is considered a hazardous area. Locate processes involving open flames well beyond this danger area.

Electrical equipment in the area should be of a type that is protected against vapor concentration. No electrical equipment should be installed inside the booth. Provide booth lighting by fixtures mounted on the outside, with the light rays directed through standard wired glass lights inserted in the exterior walls of the enclosure.

Keep accumulation of highly flammable residue on interior walls to a minimum.

3. Dry Paint in Safe Areas • Paint drying should be carried on well outside the hazardous area surrounding painting operations. Ovens and infra-red lamps, the most common equipment for drying, require adequate ventilation to keep flammable solvent vapors below the dangerous concentration point.

Oven explosions are frequent and their direct property damage is considerable, as is also the threat to the safety of employees in the vicinity.

4. Safeguard Heat-Treating Operations • Equipment for heat-treating requires careful consideration in providing proper safety controls. Adequate clearance also must be given from combustible materials that might be subjected to radiated heat and the resultant loss of moisture, which may reduce the ignition point.

5. Keep Oil Quench Tanks Cool • In the installation of oil quench tanks care must be used in providing for recirculation of the oil to keep it from reaching an ignitable temperature.

A hood and vent arrangement is essential to withdraw vapors from the areas surrounding the oil quenching operation.

6. Use Safe Cutting Oils • Cutting oils for use in machining operations should be selected to present the lowest possible fire hazard.

Machines should be cleaned regularly and kept free of excess spattering or oil accumulation. Metal drip pans located beneath the machine also should be cleaned frequently.

7. Provide Safe Rag Containers • Oil-, paint-, or grease-soaked rags should be deposited in safety containers, placed at convenient plant locations. Safety containers ought to be provided with self-closing covers.

An open rag container, if its contents take fire, permits rapid spread of the fire to any combustible material in the vicinity.

8. Limit Storage of Flammable Liquids • Storage of flammable liquids inside a building should be limited to not more than one day's supply. Keep the liquids in approved and carefully marked containers.

The main supply of flammable liquids should be kept in tanks outside the building. These tanks preferably should be buried and provided with standard venting, filling, and pump arrangements.

Topographical conditions ought to be taken into

consideration when installing tanks, so that no underground storage will be undertaken where excessive dampness or high water levels may prevail.

9. Supervise Welding Operations Closely • Careful supervision is required in welding operations, whether done as part of a manufacturing process or in maintenance work. Welding should be done in as safe a location as possible, never on the spot, except where a machine or other equipment that needs repair is of such nature that it cannot be removed to a proper location. When welding must be done on the job, make sure there is adequate supervision and that fire extinguishers are available in case of fire.

Welding operations must never be set up in areas in which there are flammable liquid vapors, gases, or combustible dusts without thoroughly ventilating the area and removing all combustible material.

Maintain portable acetylene generating units strictly in accordance with the manufacturer's instructions. See that permanent installatioins meet the standards of the National Board of Fire Underwriters.

10. Watch Belts and Moving Parts • Reduction of friction to the minimum in the operation of belts and other moving parts can be accomplished by keeping a constant check on this equipment. It is necessary that all moving parts be kept reasonably free of accumulations of dust, oil, or grease.

11. Select Proper Storage Areas for Combustible Materials • Such areas must be carefully selected, to make sure that atmospheric conditions and ventilation are good, since spontaneous ignition of many materials may be produced by chemical and bacteriological action. Maintain well-defined fire aisles.

If the area is protected by automatic sprinklers, pile stock so as not to interfere with their operation.

12. Insist on Good Housekeeping • Housekeeping covers many conditions and is not confined to the appearance of the floor. Excessive dripping of flammable materials; accumulation of combustible residues and poor storage arrangements are only a few of the conditions that constitute poor housekeeping.

A clean plant is a safe plant, not only from the standpoint of fire but from the standpoint of employee safety.

13. Provide a Suitable Fire Alarm System • Proprietary systems consist of a central-station plant alarm system under the supervision of specially trained full-time employees. This central station should be placed in a fire-resistant, detached building or properly cut off room located as far as possible from the more hazardous sections of the plant. Reliable wire circuits must be provided for transmitting alarms, and tests of these circuits should be manually conducted at least every 12 hours. Keep permanent records of the recorded signals.

Auxiliary alarm systems consist of an alarm system in the plant that is connected to the municipal fire alarm system. This arrangement eliminates delays occasioned by sending such alarms through a regular street alarm box.

Make periodic tests of such auxiliary circuits to insure positive operation.

Local systems consist of an alarm system maintained and operated by the plant, so that employees can alert the entire organization in case of fire.

14. Install a Sprinkler System • Wet-pipe systems are continuously filled with water, which is immediately discharged when heat is applied to a fusible portion of a sprinkler head.

Dry pipe systems contain air under pressure which, when released through the fusing of a sprinkler head, permits water to flow into the system.

Pre-action systems comprise pipes filled with air, with a supplemental system of heat-responsive devices. When actuated, these devices open a valve permitting water to flow through the piping system.

Deluge systems consist of open sprinkler heads attached to dry pipes that are connected to the plant water supply. These systems are controlled by a valve operated through heat-responsive devices.

All sprinkler systems should be provided with either a supervisory central station alarm or a water flow alarm with an outside audible signal.

15. Put In First Aid Firefighting Appliances • Even though a plant may be protected by signaling systems and automatic sprinklers, a full complement of fire extinguishers should be installed. These should be charged with chemical solutions, vaporizing liquid, inert gas, or dry compounds, whichever materials are best suited to the types of fires that the hazards of the location indicate.

Prompt use of a suitable extinguisher on an incipient blaze often can prevent loss and disruption of plant operations.

Expert opinion is desirable on the proper types of extinguishers to install. Use of an improper type may result in the spread of a fire.

16. Organize a Private Fire Brigade • Fires that exceed the control potential of extinguishers and sprinkler systems often can be kept within bounds by a well-trained private fire brigade. It should consist of a well-trained and disciplined group of employees provided with the necessary apparatus to control a fire in the interim between its discovery and the arrival of the municipal fire department.

The training of men for such a brigade also arouses increased interest on the part of all employees in maintaining a fire-safe plant.

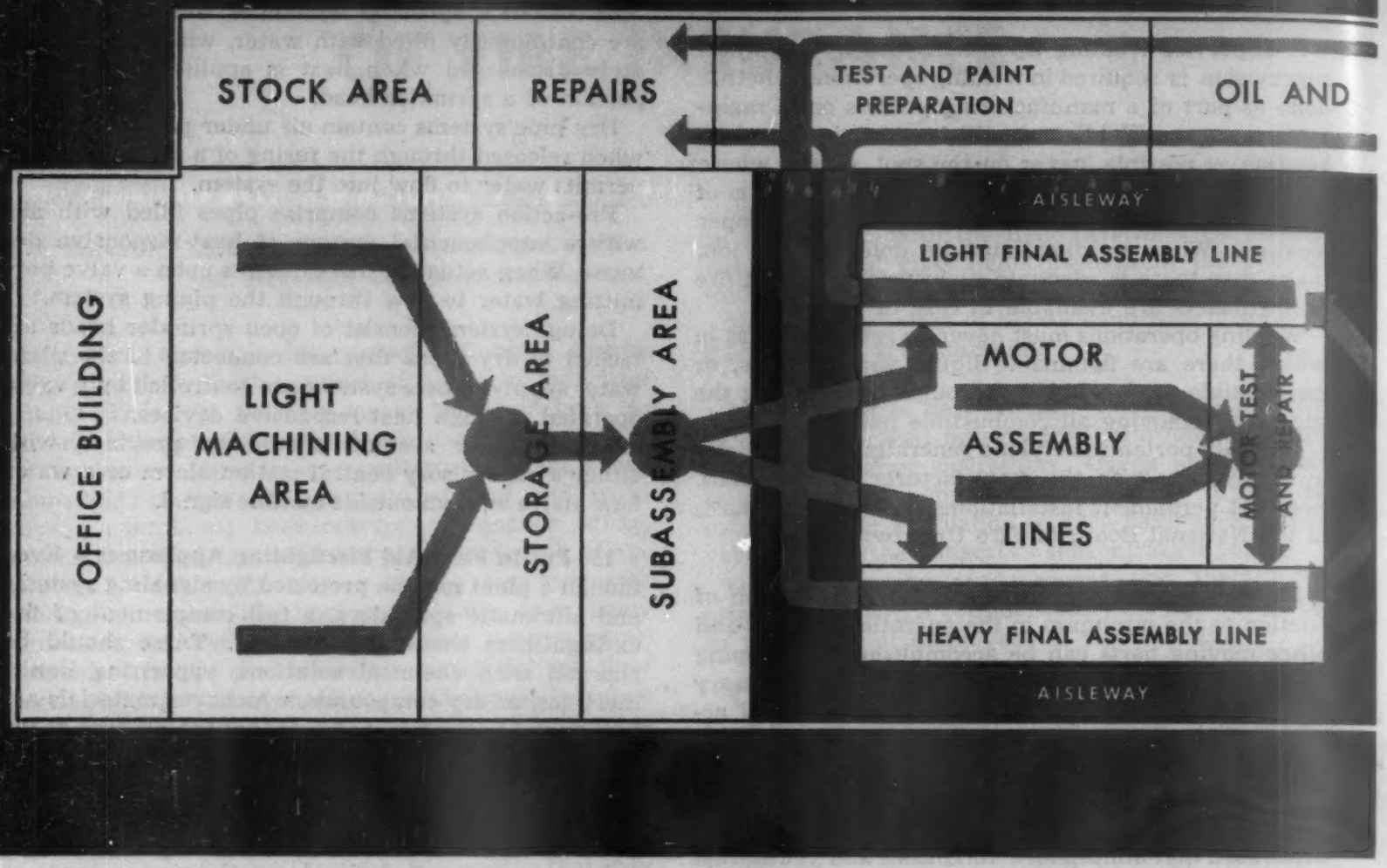
17. Install Standpipe and Hose Systems • These systems provide one of the best means for effective firefighting inside a building. They are an excellent auxiliary to the municipal fire department. Also, they may be used by those trained in handling heavy streams as effective first aid fire protection.

Where buildings exceed four stories in height, make sure that the piping is of sufficient size. Either small or 2½-in. hose may be used, depending on the hazards in the department involved.

Many other protective devices may be used to supplement those described here. Their desirability depends to a great extent on local plant conditions.

The installation of any protective device calls for expert advice. In all cases plans and specifications should be submitted to the inspection departments that have jurisdiction. All devices should be approved by independent testing laboratories, to insure standardized construction and good workmanship.

SCHEMATIC LAYOUT PLAN • CLARK EQUIPMENT COMPANY



$85,000 LAYOUT SAVES

EDWARD D. KEMBLE • PLANT MANAGER, INDUSTRIAL TRUCK DIVISION
CLARK EQUIPMENT CO., BATTLE CREEK, MICH.

BY AN EXPENDITURE of $85,000 in new layout of manufacturing and storage facilities, Clark Equipment Company will realize an annual saving of $300,000 in production costs. The layout was developed over a period of months for production of fourteen fork lift truck models.

In the new layout, all subassembly operations have been removed from the final assembly line. Subassemblies flow from left and right to the final lines in the building's center (see layout diagram above). Operations have been segregated and labor teams were established according to function.

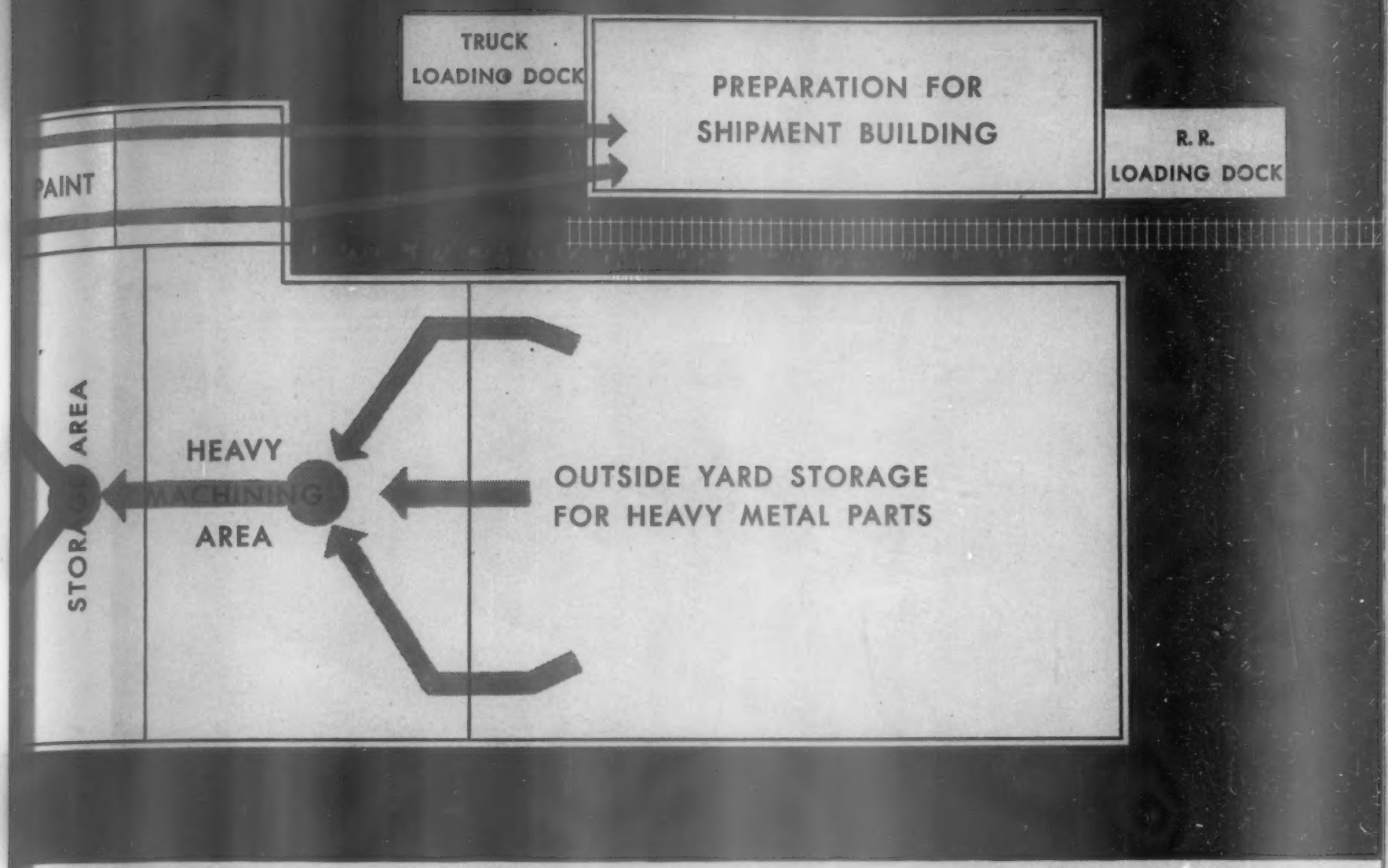
With this segregation of operations, direct assembly cost has dropped more than 35 per cent. For example, with the former layout and integrated operations, production downtime cost was about $5 per minute in direct labor alone. This was because of the close relationship between final and subassembly operations. Too many men were forced to stop work when a minor breakdown occurred. With the new layout, the cost per minute of downtime is less than 50 cents.

The new layout subdivided the plant, and its worker groups, into four main divisions: Light machining, heavy machining, motor and final chassis assembly line, and repair and storage. This arrangement allows for the utmost flexibility in production. Trouble can occur in any one of the four sections, and the other three can continue to operate by working out of production floats or banks from the one section that is having trouble.

Handling costs have been reduced more than 25 per cent through an extensive palletization program and a systematic materials storage plan. Considerable progress has been made in order that materials from outside suppliers and other Clark plants can be received on either permanent or expendable pallets.

Materials storage sections for parts built in the plant and for those received from outside suppliers are strategically located throughout the plant. Palletization of all materials permits full utilization of the building's cube for storage. As a result, twice the volume of materials is now stored in the same area. As materials are required for the subassembly or main assembly line, they are moved on pallets by fork trucks to the point of use. Once at the production site, handling is again minimized. Operators work directly from pallets.

Virtually no production time was lost during the change-over from the old layout to the new. The new



$300,000 A YEAR

layout was carefully planned and developed for months before the change was scheduled to take place. Key members of the supervisory force were selected and given temporary assignments during the change-over. It was their job to get the new plan into operation quickly and efficiently. The change was made over several weekends. The moment production stopped at the end of one week, a complete maintenance construction gang moved onto the job. Sections of the plant were progressively changed over. At the close of each weekend, the construction gang put the plant back into workable order so that production could start Monday morning. Both direct labor and handling costs came down progressively as the new layout was installed. Not one unit of production was lost during the installation.

It was found that by subdividing many of the subassembly, machining, and final assembly operations, the average workman's capacity and desire for specialization could be gratified. Since under this system he is not required to do as many tasks depending on memory reflexes activated by long training, the new employee requires far less training time—many can start a new job and be operating efficiently within a matter of hours. Under the abandoned system, training of new workmen had required days.

Important in the planning was the desire by the company to develop small plants within the larger plant. Departments were laid out with the idea of reposing complete responsibility within each for production and quality of given components. Similar operations within each department were then grouped together and in charge of each was placed a group leader with superior knowledge of his assigned task. Formerly, supervisors had general assignments, and could not closely supervise either the operation or the worker.

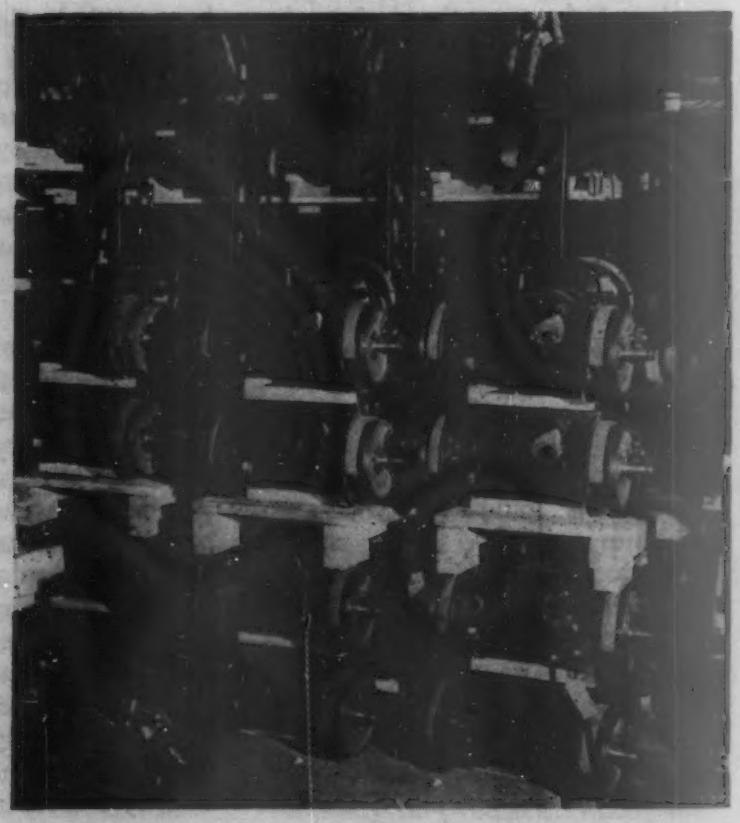
In addition, each supervisor is the manager of his own job. Each group supervisor is responsible for approximately $1,000,000 worth of annual business. Also, he is responsible for approximately 100 direct and indirect workers. He is in absolute control of his own group. He must sign the weekly payroll, the efficiency report, and all cost reports. In this way, each departmental supervisor is, in effect, the manager of a small plant.

Here are a few of the early results of the new layout. Cramped production space was eliminated by producing more per square foot of manufacturing area. A problem of insufficient storage area with the old plan was remedied by palletization. Handling costs were reduced by 25 per cent. Direct assembly costs are down more than 35 per cent and indirect labor costs, 25 per cent. Materials are forced to flow by subdividing the plant into four main functions and groups. Thus, Clark's investment is paying at the rate of 3½ to 1.

CONTINUED ON NEXT PAGE

1 YARD STORAGE is utilized for heavy parts not affected by weather. Less manufacturing floor area is required for storage. Most materials are palletized, moved by fork truck as required

3 HEAVY PARTS go from the heavy machining division through bonderize and paint by overhead rail



4 PALLETIZING has paid off. Twice the former volume can now be stored in the same floor area

2 **ENGINES are assembled to transmission and drive axles on separate assembly line. Completed power units feed to test stands then ride on four-wheel dolly trucks to one of two assembly lines**

5 **FINAL LINE feeds from operation to operation on dolly trucks that have floor rail to guide them**

6 **COMPLETED TRUCKS come from final assembly under their own power—on their way to painting**

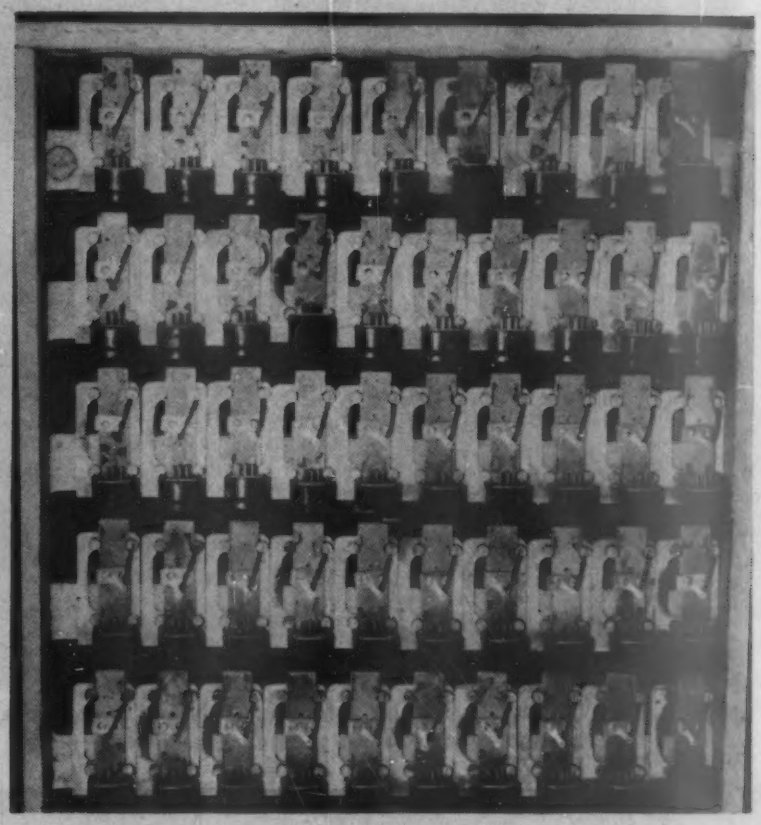
CASES IN WORK SIMPLIFICATION

TRANSPORTING, HANDLING, storage, inspection, and counting of small parts had long been one of the most bothersome production problems at Wire Recording Corporation of America, Brooklyn, N. Y.

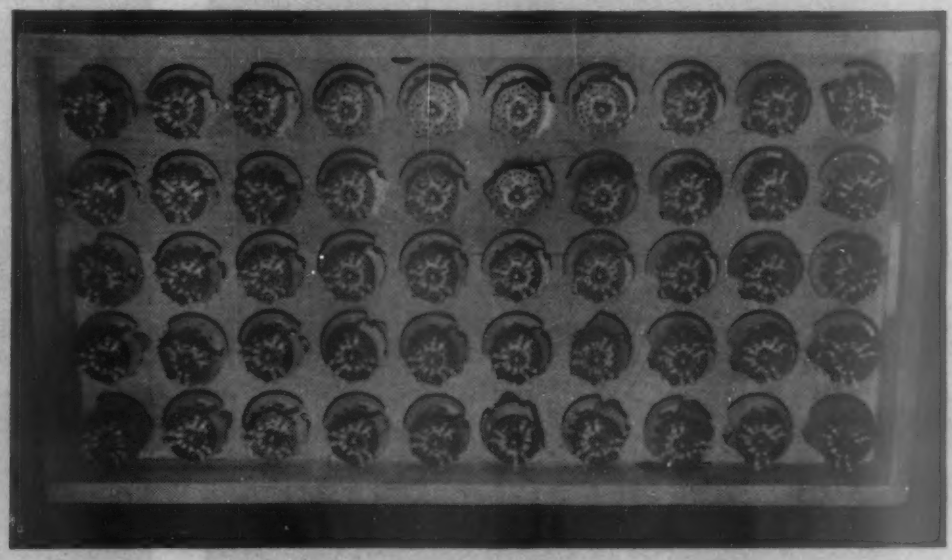
Application of the principles of work simplification led to the establishment of five requirements for specially designed boxes which would be easy to construct:

First, boxes must *protect all parts* subject to damage. Second, boxes must be *easy to load and unload.* Third, the boxes must be sturdy enough to *stack readily.* Fourth, boxes must be of a design, size, and construction that will make them *easy to handle.* And fifth, locating fixtures must be arranged so that it will be *easy to count quantity* of parts in the box.

How these requirements were met, and the savings produced, are shown in the following photographs and notes from the files of Coleman Lee Finkel, factory manager.

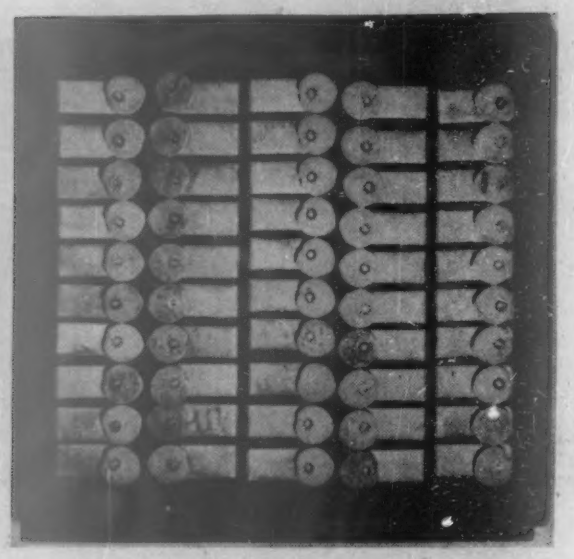


1. PROTECT ALL PARTS. Subassemblies with many projecting parts were subject to damage when placed in old boxes, both during transportation and when being removed. Final inspection has experienced a 100 per cent decrease in the number of defects attributable to handling.

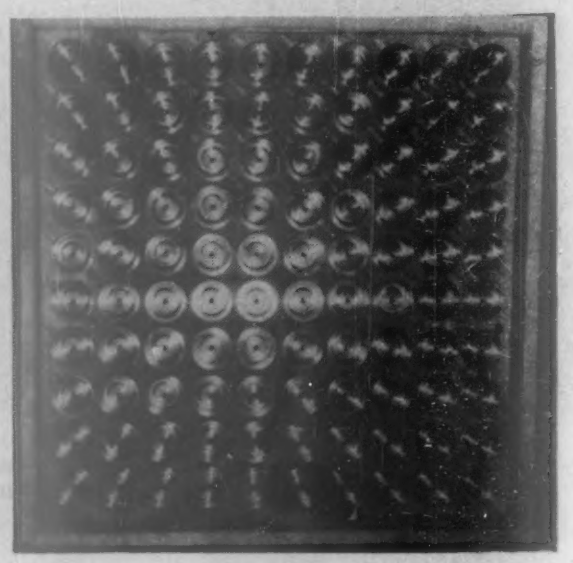


2. EASY TO LOAD AND UNLOAD. "Interlocking" of projections made it difficult to load and unload any but the simplest of parts; great care had to be exercised by operator to prevent damage. Holes in base just slightly larger than diameter of shaft guarantee proper separation of parts in new box. Loading takes a trifle longer, but unloading has been speeded tremendously. Mechanical and electrical rejects attributable to handling at subassembly inspection have been reduced 98 per cent.

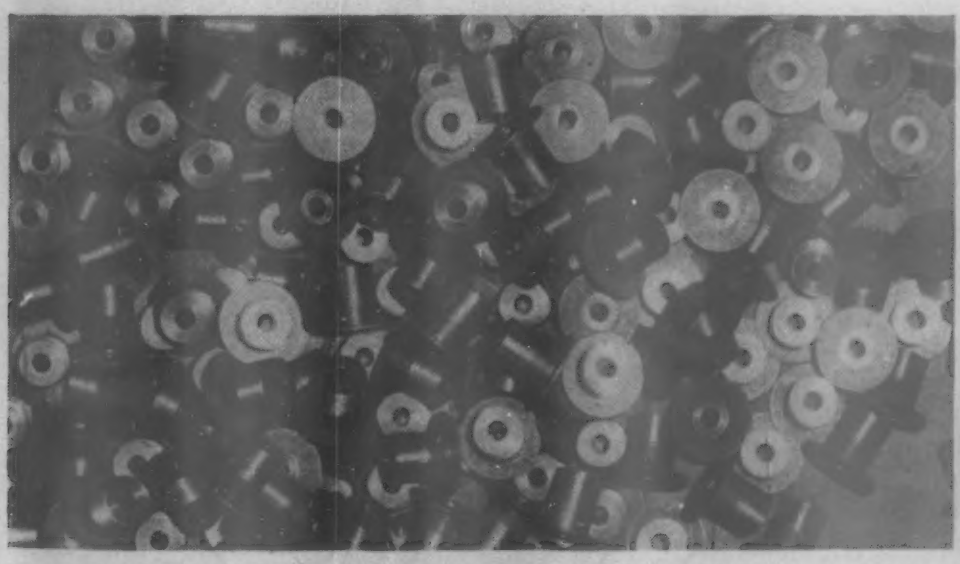
10. Wire Recording Corp. of America

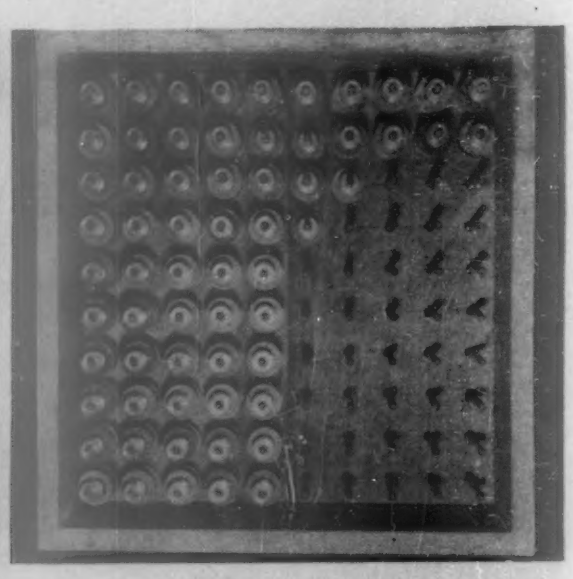


3. STACK READILY. Excessive storage space was required when parts were handled in paper boxes because of the impossibility of stacking. Uniform size, relatively thick sides, and inherent strength of wooden boxes permit stacking to considerable height, with consequent saving in space.

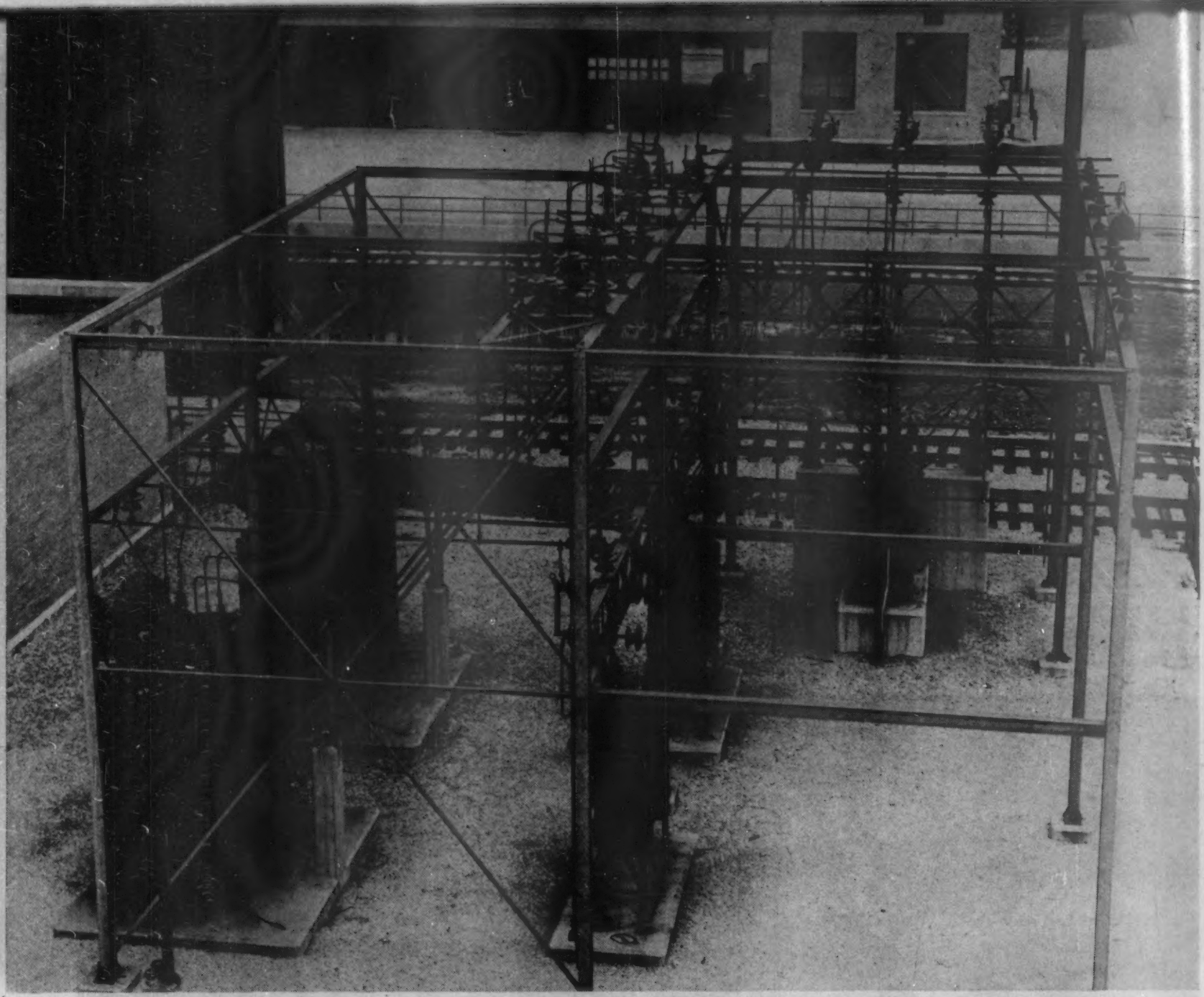


4. EASY TO HANDLE. Weight of finely machined drums made paper boxes difficult to handle, sometimes caused boxes to rip or break, with resulting damage to parts and delay for picking up scattered pieces. Gripper slots permit handler to carry more parts with far less effort.





5. EASY TO COUNT QUANTITY. When parts were handled in old boxes, it was necessary to remove them in order to make a count. Special loading fixtures (spindles, in the case illustrated) establish capacity of new boxes automatically. Rows of ten each are used in all boxes to permit quick calculations. Even when parts are set on spindles three deep, determination of either capacity or partial loads is only a matter of seconds. When fully loaded, all boxes contain multiple of 50 or 100 parts.



POWER COMES IN at 33.5 kv., 60 cycles, three phase, and is stepped down to 13.8 kv. by two 5000-kva. transformers. Their primaries are connected delta and are protected by oil circuit breakers

DISTRIBUTION SYSTEM SPLITS MACHINE-CHANGE TIME IN HALVES

EUGENE M. MARCHAND • PLANT ENGINEER, NEW DEPARTURE DIVISION
GENERAL MOTORS CORPORATION, SANDUSKY, OHIO

A HIGHLY FLEXIBLE power distribution system has been installed at the New Departure plant in Sandusky. It was designed to permit machinery to be shifted in any manner, and to any location, with the minimum of cost, and with full assurance that all needed power can be taken off to supply the demands of production equipment.

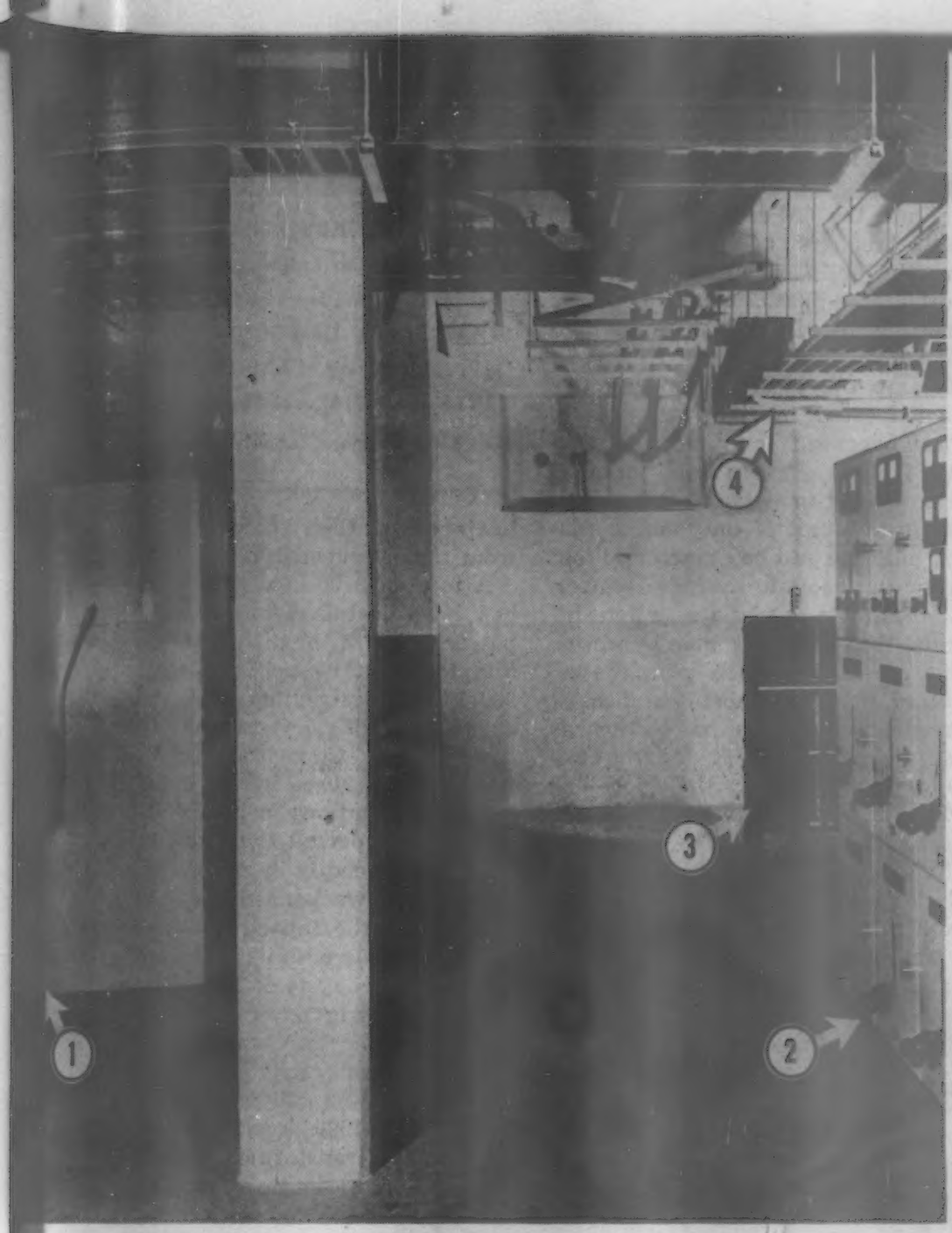
Incoming lines deliver three-phase, 60-cycle power at 33.5 kv. to an outdoor substation in which are located two 5000-kva. tranformers which reduce the voltage to 13.8 kv. The primary of each transformer is connected delta and is protected by a 600-amp. 34.5-kv. oil circuit breaker of 500,000 kva. interrupting capacity. The secondary of each transformer is connected Y with the common point grounded, and is protected by a 600-amp. 15-kv. oil circuit breaker rated 250,000 kva. interrupting capacity located in the master substation.

These two oil circuit breakers feed a common 13.8-kv. bus from which cables transmit power to the various substations. Each cable is protected by a 600-amp., 15-kv., 250,000-kva. interrupting capacity circuit breaker.

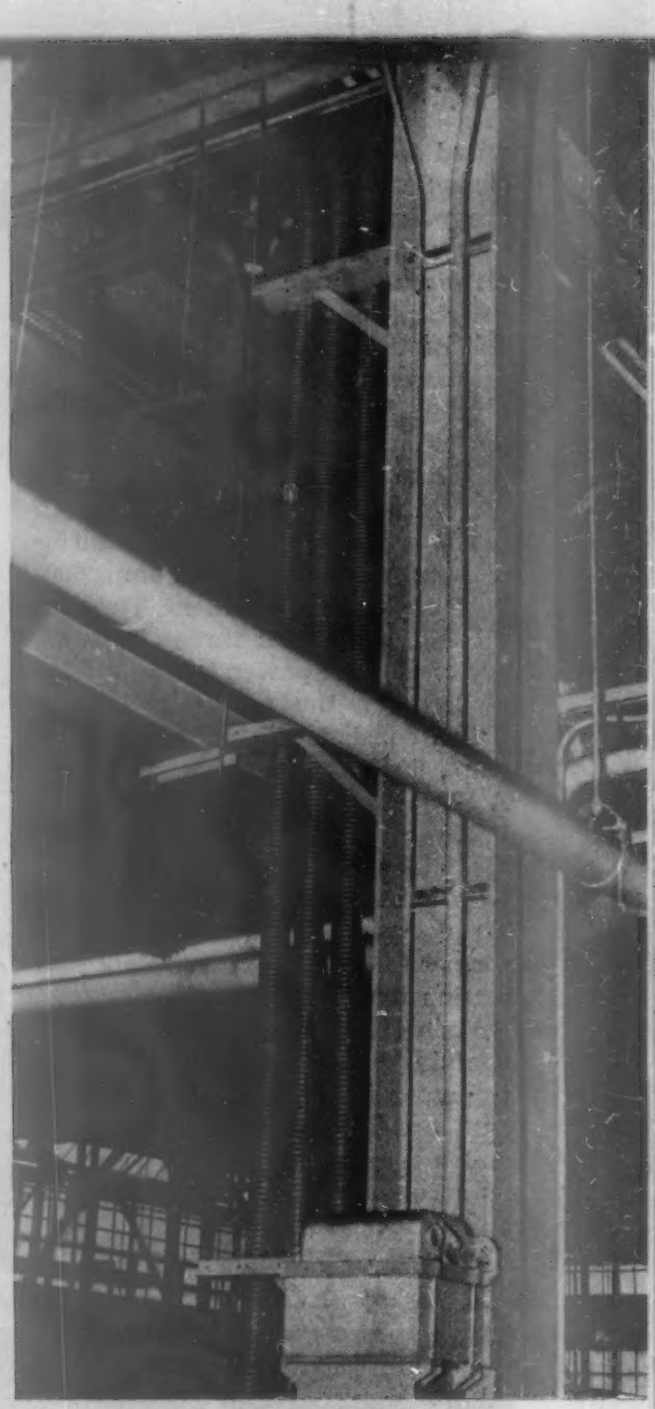
Five of the total of seven substations are located underground in the manufacturing area. Each subterranean substation consists of two 1000-kva., three-phase, air-cooled transformers having a 13.8-kv. primary and 440-volt secondary. The primary of each transformer is

wired to two circuit breaker cubi-

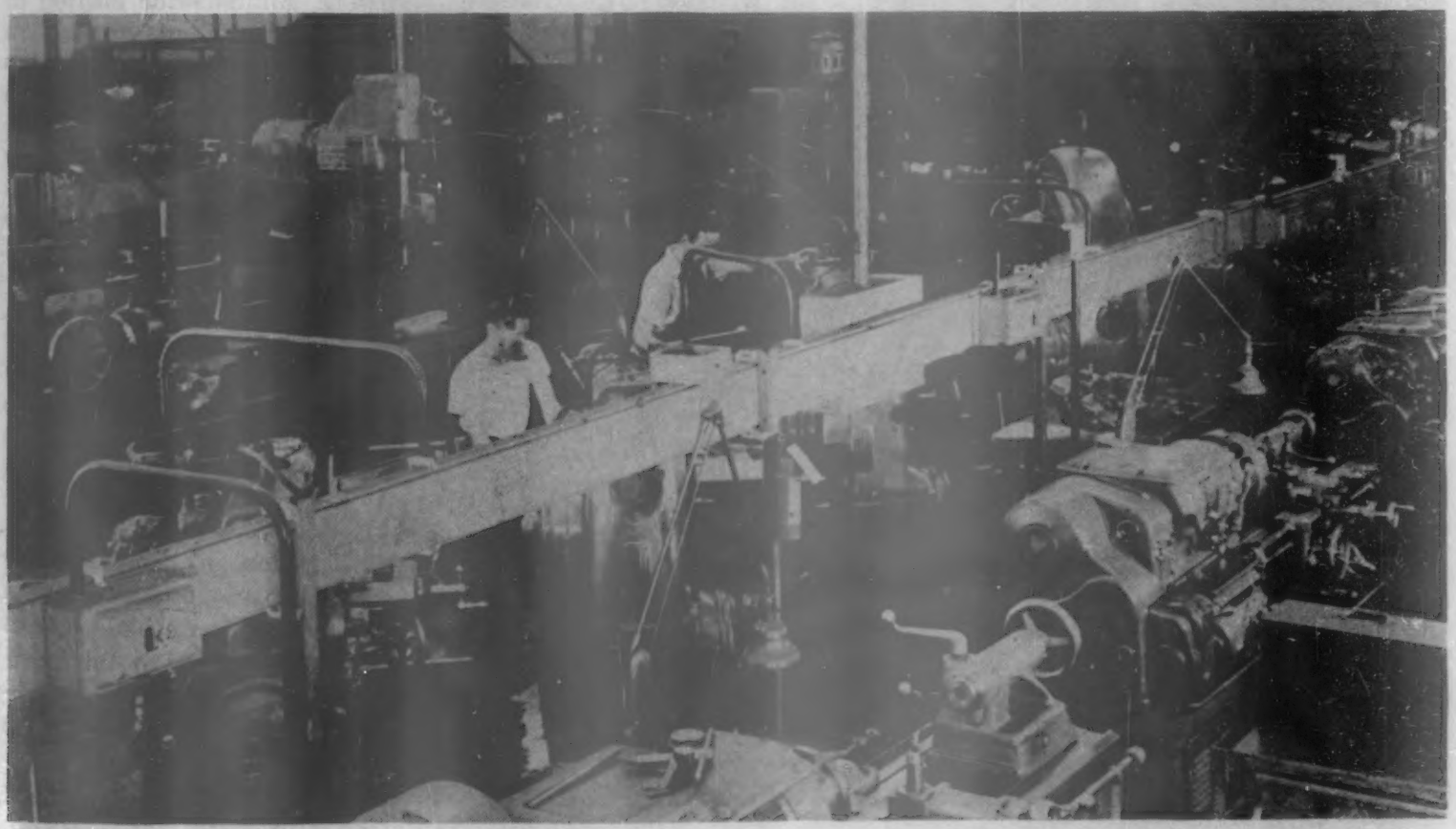
arrangement for individual trans-



UNDERGROUND SUBSTATIONS. (1) 100-kva. transformers; (2) circuit breakers; (3) 270-kva. capacitor bank; (4) armored cables to production area



ARMORED CABLES lead from substations to the overhead bus duct



FLOOR-MOUNTED BUS DUCT simplifies plugging in machines when changes in layout are made, and is widely used. It is energized through drops from overhead duct. The floor-mounted duct is portable

wired to two circuit breaker cubicles. Separate cables leading from the master substation are connected to each cubicle. A 600-amp., 15-kv. oil circuit breaker of 250,000 kva. interrupting capacity is installed in one of the cubicles energizing the primary of the 1000-kva. transformer. In case of cable failure the oil circuit breaker can be transferred to the other cubicle and the transformer re-energized.

The secondary of each transformer is protected by a 2000-amp. 600-volt air circuit breaker. Through this circuit breaker three-phase, 60-cycle, 440-volt power is transmitted to half of the secondary board, which consists of a number of 600-amp., 600-volt air circuit breakers. A 2000-amp., 600-volt air circuit breaker ties the two halves of the secondary switchboards together in each subterranean substation. This arrangement permits one transformer to operate the complete substation in emergencies.

Each of the other two substations contains one 1000-kva. air-cooled transformer which has an oil circuit breaker on its primary side and a main air circuit breaker on its secondary. There is also a secondary board, similar to the arrangement for individual transformers in the subterranean substations.

From the 600-amp., 600-volt circuit breakers of the secondary switchgear in each substation 440-volt, three-phase, 60-cycle power is transmitted through three-conductor, 750-mcm. armored cable to 600-amp. overhead plug-in type bus duct located in the roof trusses. The overhead bus duct covers the factory area in such manner as to permit installation of machinery in any part of the manufacturing building and be not over 50 feet from an adequate source of power.

Machinery loads are taken off from the overhead bus by drops that are calculated to carry the required load. In most instances a secondary portable bus, which is assembled from 10-ft. lengths, has been installed along the floor. The drops from the overhead bus are of sufficient capacity to take care of the load on the lower bus. Machines are merely plugged in at the points of operation.

The use of plug-in bus duct eliminates the need of shutting down power lines when additional machines are installed.

All ventilating fans and unit heaters get their power directly from the overhead bus duct.

Every Month . . .

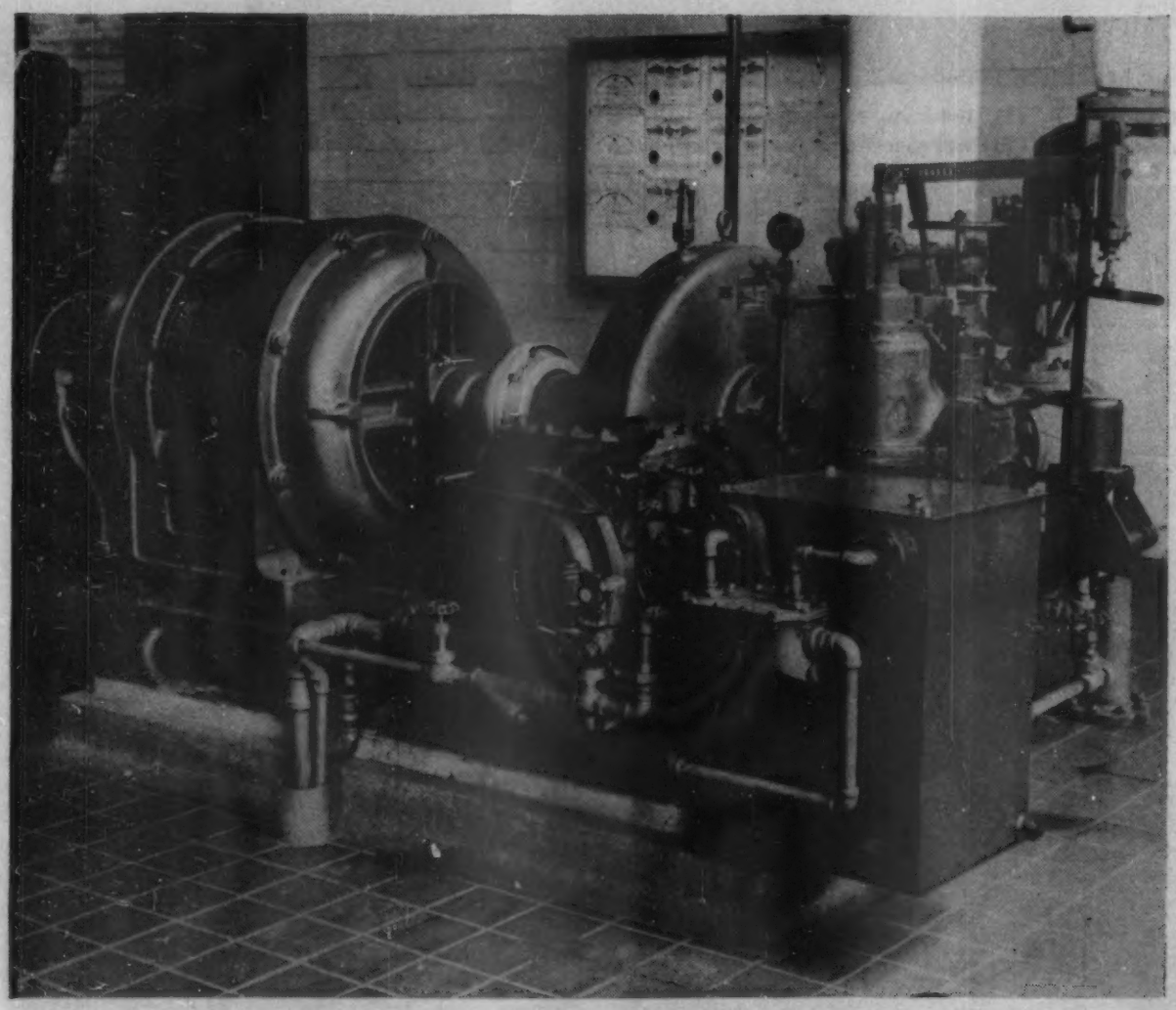
AMONG THE ADVERTISING PAGES, these valuable aids to low-cost production: the plant operation man's guide to **WHAT'S NEW IN EQUIPMENT** (page 136) . . . a summary of **LABOR DEVELOPMENTS** (page 214) . . . things **YOU WANT TO KNOW** more about (page 204)

A total of 3700 kva. of capacitors has been installed to correct the power factor of the distribution system to about 95 per cent. About 200 kva. of capacitors is switched on and off with certain low power factor loads. Capacitors aggregating 1350 kva. were installed in the various substations in banks of 270 kva. each to permit switching them off the line readily in case the voltage over the weekend rises too high. The rest of the capacitors were installed in 90-kva. units on the overhead bus duct systems in the heaviest loaded, lowest power factor areas.

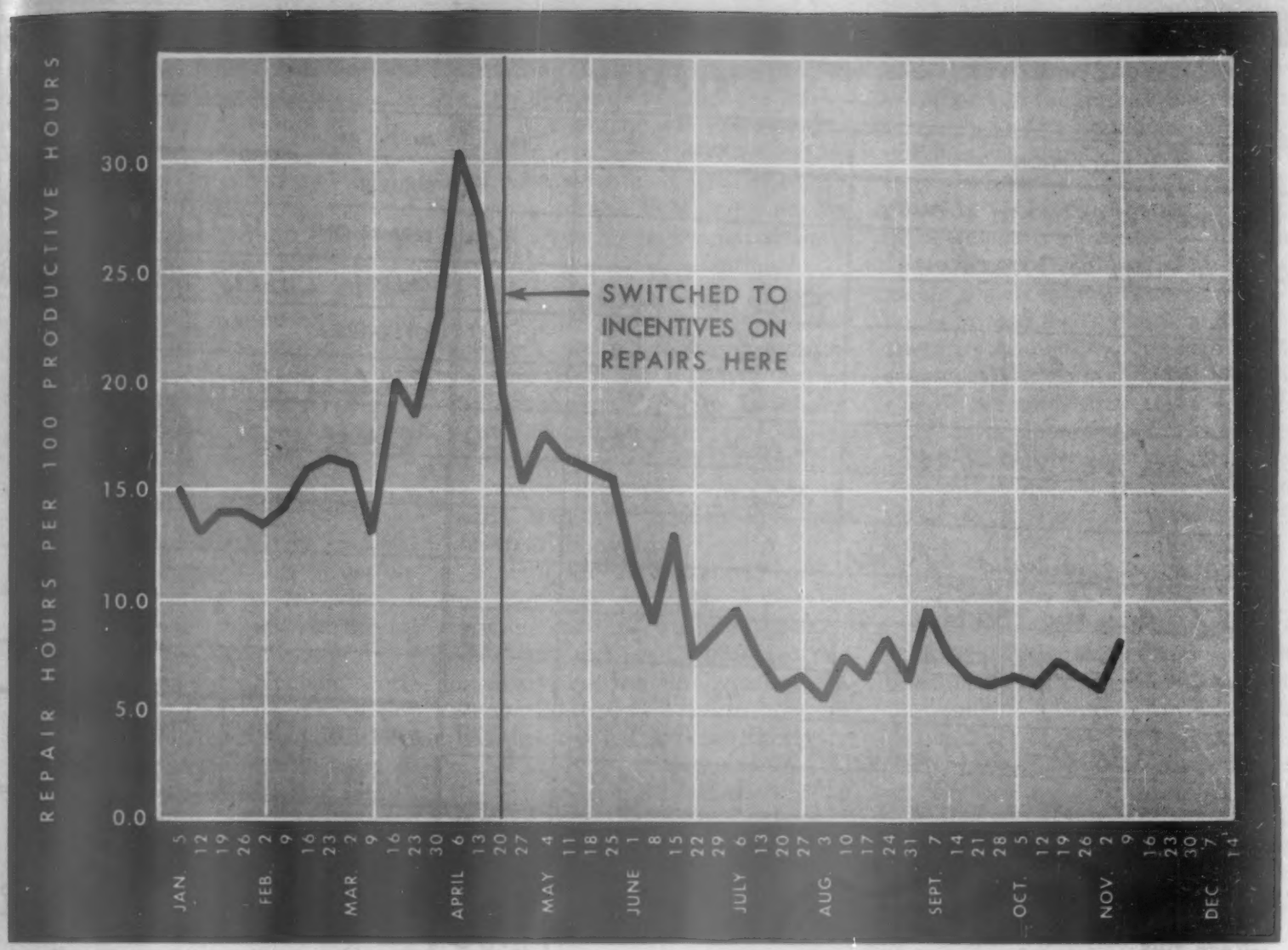
Provision has been made for increasing the capacity of the 5000-kva. oil-cooled and the 1000-kva. air-cooled transformers one third by adding fan cooling.

A substation supervisory system was installed with a bell and annunciator located in the plant protection office to sound an alarm and indicate in which substation troubles such as an overheated transformer, water rising above floor level, and tripped primary or main secondary breakers occur.

To give an idea of the facility with which equipment can be run in at any point in the system, the installation of 50 feet of portable bus duct, the connection of some 30 machines, and dropping a line from the overhead bus duct to the portable bus duct will require only about 100 man-hours. This is substantially less than half the time that would normally be required.



STEAM-DRIVEN TURBOGENERATOR SET supplies power to departments whose equipment must be kept operating. It starts within 8 seconds after an outage



RATIO OF REPAIR TO PRODUCTIVE HOURS FOLLOWED SAME PATTERN THROUGHOUT PLANT AS IN LIGHT LATHE DEPARTMENT (SHOWN ABOVE)

INCENTIVES HALVE REPAIR BILLS FOR DEFECTIVE PARTS

M. A. HOURIGAN • INDUSTRIAL ENGINEERING DEPARTMENT
RITTER COMPANY, INC., ROCHESTER, N. Y.

BEFORE APPLYING INCENTIVES to repairing rejected parts, repair hours at the Ritter Company were 6 per cent of productive hours; at present they are 3 per cent, with a good possibility that they will drop still further as the cause of each repair is ferreted out and eliminated. Results thus far have been so encouraging that the same technique is now being applied to non-productive accounts.

Before the incentive installation, salvage work on rejected parts was done on a guaranteed rate. This rate represented the average incentives earnings in the plant. It was originally introduced during the war to pay an incentive worker when he was assigned to a repair job for which he was not responsible. As a method of payment it was adequate, but as a stimulus to efficiency it was ineffectual. As a result, repair costs were well over pre-war levels (when repair work had been paid at base rate).

Analysis of past performance revealed that the principal causes of the excessive repair bill were: Ultra-refined inspection techniques held over from the war period; new designs and frequent alterations of old products; a generally poor quality in the components being supplied by subcontractors; makeshift tooling inherited by productive departments without alteration from experimental runs; and carelessness on the part of production operators.

It was apparent that the elimination of most of these causes would take a good deal of time and missionary work. There was, however, one item on which the industrial engineering department could take action immediately:

According to the analysis, the greatest single cause of the repair bill was the loss of incentive tempo by the repair operator as soon as his rate was guaranteed.

Estimates of the time required to

REPAIRS

DESCRIPTION	CAUSE	TIME
Chuck piece on arbor		
and strap to machine		.30
	Face not square	
Reface (1 cut)	with hole	1.15
	Parts from	
Unload pc. to box	heavy lathe	.20
	dept.	
Check squareness of face		
with center hole		
2.25 ÷ 10 pcs.		.23
S/u 30.0 ÷ 350 pcs.		.09
ESTIMATED TIME		1.97
ALLOWANCE	30%	.59
LEVELED TIME		2.56

Mr. Phil De Lee

SUBJECT

REPAIRS ON: 970

CHARGE: 302-Heavy Lathe

OPERATION:

Reface back face square with hole

QUANTITY	LOT	TIME	OPERATOR
350	8	.0427	307

INDUSTRIAL ENGINEERING DEPT.

BY M.A.H. DATE 4/28/48

FIGURE 1

DATE _____

REPAIR "FOLLOW-UP" SHEET

PART	EXCESS REPAIR HOURS	CAUSE	REMEDIAL ACTION	PROGRESS CHECK 1	2	3	4
970	15.0	Locating surface at	Inform heavy lathe	5/10/48	5/19/48	5/20/48	5/28/48
		of square for	department of error.	Heavy	Pc. O.K.	Bushing	Bushing
		bore and face	Check cause	lathe	at heavy	pressed	fixture
		operation	with foreman	informed	lathe	fault	repaired

FIGURE 2

PROCEDURES illustrated above for a repair order in the light lathe department resulted in the reduction of repair costs illustrated in the diagram on the preceding page. **FIGURE 1.** No repairs can be made until time required has been estimated and entered on repair order by industrial engineering department. **FIGURE 2.** Follow-up record insures that cause of repairs is eliminated as source of future trouble

complete a repair job compared with the actual time taken showed that even the most conscientious operators sometimes took twice as long as necessary to complete a repair assignment. For the unscrupulous, the guaranteed rate was a windfall. While on the guaranteed rate, the operator could complete the repair assignment and run off part of a regular incentive job before notifying the time clerk that his repair assignment was completed. With his work already half finished, the operator would have very little trouble in earning an excessive rate on his next job.

Two Possible Solutions

There were two courses possible in order to correct this situation. One was to return to the pre-war system of paying base rate for all repair work; the other was to use a time measurement of repair work in order to get the type of response that was being paid for. The first solution was discarded because it was considered unjust; the second appeared impractical since it was thought that the time checks required would cost as much as the savings to be realized.

Estimating of repair work was finally resorted to and proved to be the answer. By this method, the expense of setting the rates is but a fraction of the savings accruing. By estimating, one man can set twenty or more rates a day. The success in using this method, however, depends on selecting an estimator who is capable of estimating repair work closely enough so that an incentive rate can be paid on the basis of his estimate.

Ritter's experience has been that several men are required to start the program. As soon as the backlog of repairs in each department is cleaned up one man can handle ten to fifteen departments of average size.

Here is an example of this technique in practice: The foreman of the small lathe department received a regular production lot of end bells for processing. The operation to be done in his department was to bore the center hole and face one side. He discovered that he could not perform his operation on this particular lot because the locating surface was not square with the center hole.

The locating surface was machined in the heavy lathe department. The foreman found that he could not return the parts to the heavy lathe department for refacing because in an intermediate operation a bushing had been pressed in the center hole, and the heavy lathe department was not tooled to reface the piece after the bushing had been assembled. Therefore, the foreman of the light lathe department had to repair the parts before he could begin his operation.

Under the new system, no repair can be paid for unless it carries a standard set by the estimator, so the foreman's first step is to call on the estimator. If the estimator agrees that the repair is necessary, he discusses the method to be used in making the repair with the foreman. He then fills in the form shown in Figure 1.

Starting on the left side, he notes the elements necessary to do the job and assigns a time value to each. Set-up time is estimated and prorated over the number of pieces. Elemental time and set-up time per piece are totaled, and the necessary premium percentage is added. At the bottom of the sheet the leveled allowed time for the job is recorded. The reason the repair has to be made, is entered in the column headed "cause."

The estimator then fills in the right side of the sheet. (A carbon paper under this side of the sheet provides a duplicate copy.) He enters part number, account charged, and department against which the repair is charged. Next comes a brief description of the operation. At the bottom of the sheet, quantity, lot number, incentive rate, and operator's number are entered.

After the estimator signs and dates the sheet, he separates the two copies, retaining the top one for his files and giving the duplicate to the operator. With the duplicate sheet, the operator can notify the time clerk that he has been assigned to the repair and is to be paid at the rate shown.

Measure of Effectiveness

The estimator can easily measure the effectiveness of his work. At regular intervals, he has the tabulating department furnish him with a summary of the repair hours spent in each department. With this information, he can compare the repair hours spent on his estimated standards with previous periods when no standards existed in this plant.

However, he must make a comparison to some base which will hold true regardless of any fluctuations in production schedules from period to period. (Without such a base, it is impossible to know whether a reduction in repair hours is a result of the application of incentives, or simply a drop in productive hours.) This is done by dividing the repair hours in each department by each 100 productive hours in that department. This yields a percentage ratio of repair hours to productive hours, and variances in productive hours are not a consideration. A graphic record of the before and after trend in the small lathe department is shown on page 123. Although the absolute numbers differ, the trend for the plant as a whole has been very similar.

Getting at the Cause

With a method of getting repairs done efficiently, the estimator is in position to begin the second part of the control program—elimination of the *cause* of the repair. From his estimated times, he has a record of all repairs by part number and quantity. With this information, he can compute the total hours spent in repairing each part. He notes the major offenders on a sheet similar to that in Figure 2. He also enters the reason for the repair. After an analysis of what can be done to eliminate the repair hours, he enters his course of action in the column, "remedial action." The additional columns are to record progress in making corrections.

In the case described, 15 hours were spent on refacing the end bell in the light lathe department. The obvious remedy was to inform the foreman of the heavy lathe department that his operation was at fault. That this was done is shown by the note in the first column of the progress check. The second entry indicates that the part was checked as "O.K." through the heavy lathe department when the next lot was run. In the third column, the operation of pressing the bushing in the center hole is shown to have been at fault. It was discovered that the press was springing the work, and consequently the locating surface was pulled out of square with the hole. The final entry shows that the press fixture has been redesigned to eliminate the distortion of the piece.

A "follow-up" of this type combined with the incentive application discussed earlier has been found to reduce materially the cost of repairing defective work.

OPERATING SHORTS

Readers are invited to contribute brief articles, illustrated when possible, reporting out-of-the-ordinary operating accomplishments. Accepted articles will be paid for

TO HELP REDUCE plant maintenance costs, the engineering department's field division methods section of the du Pont Company's Chambers Works at Deepwater Point, N. J., set up its own plant exhibit of industrial tools and equipment. The display included 76 standard and newly developed items. During a 4-day period, more than 650 maintenance and supervisory technicians were able to view and handle all items, and to note and take away new ideas for application, in a 4-page index given each man

BETTER CONTROL and higher efficiency have been achieved through the installation of a large window in the office of the garage supervisor at the truck and coach division of General Motors Corporation, Pontiac, Mich. Side portions of the window were placed at a 30-deg. angle, which allows a full view of the garage area. Now when information is required, the supervisor can merely look out of his window and answer a question without loss of time

Two Colors for Safety Identification

A safety color program which involves just two colors—fire red and safety yellow—is one of the by-products of the "daylight" painting scheme adopted in Libbey-Owens-Ford Glass Company factories.

Management had found that in the large plants, which manufacture big sizes of plate glass, fire extinguishers easily reached from the floor were often obscured by tall stacks of glass, boxes, or machinery. Therefore a standard 18-in. circle of fire red, with a white arrow pointing to the equipment and bearing the word "fire" in red, was painted high above every piece of firefighting equipment.

The safety yellow is a yellow which has the highest visibility in the color spectrum. It is used for painting all moving objects, such as lift hooks, conveyor baskets, trucks, tractors, and other mobile equipment. Truck traffic lanes are bordered with 6-in. bands of yellow. Doors leading to hazardous areas are cross hatched, and master control switches, handles, and parts of machinery where safety is paramount, are painted yellow.

The two-color safety plan has the approval of the American Standards Association and has been commended by the National Safety Council.

•

Truck Driver Inspects All Press Dies

Because he handles all dies in the press room at Tappan Stove Company, Mansfield, Ohio, the fork truck operator has been made responsible for inspection of the last piece out of the presses. He determines need for die repair. Press operators on other shifts leave their last pieces for him to inspect.

Wartime training fitted the truck driver for this responsibility. He removes from storage and replaces in the racks all press dies, so he is the logical man for the job.

Formerly, when responsibility for inspection rested with each of the many press operators, dies in need of repair frequently were replaced

on storage racks. Emergency repairs were numerous. Press run costs were high.

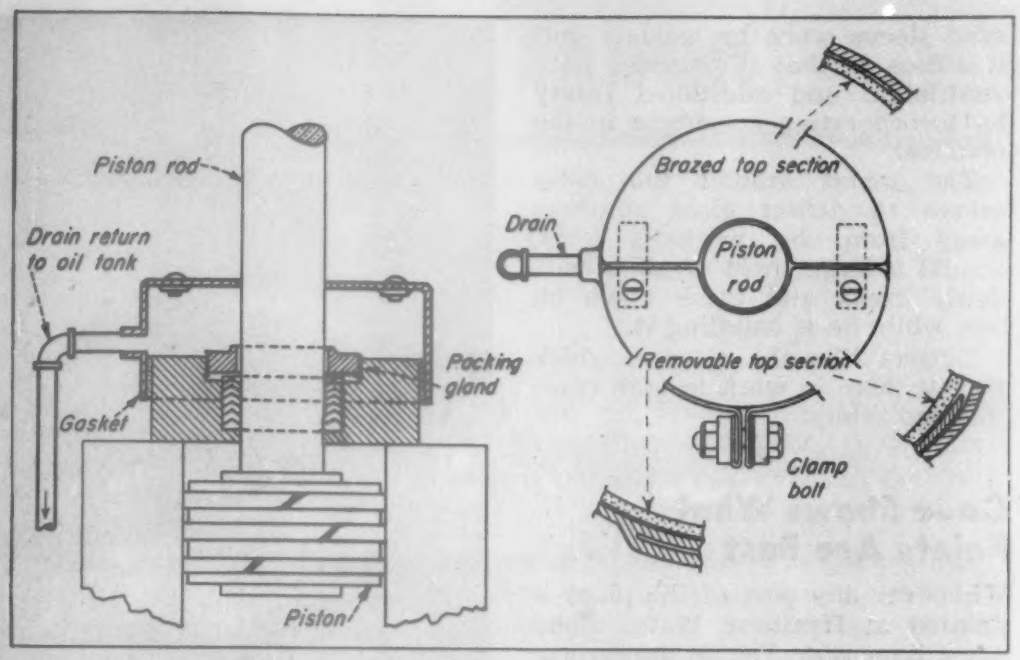
Now, extra press setups have been eliminated. Rush repair jobs have greatly diminished in number. The toolroom has enough time to repair all dies properly.

•

ABSENTEEISM at Leslie Company, Lyndhurst, N. J., has dropped considerably since the installation of a sign, placed over the employees' entrance, which shows how many workers were absent the day before. Numbers are painted on small interchangeable wood panels that slide into a grooved holder. The company's absentee record for last year was only 1.67 for all reasons. Of course, close follow-up of every absentee, and the services of a trained nurse in the dispensary, as well as a doctor in attendance an hour each day, have contributed to the low figure

•

SLANT-SHELVED PART BINS located along the final car line make work easier for the employees at Chevrolet Motor Division, General Motors Corporation, Flint, Mich. Toteboxes, filled with stock, are periodically placed in the bins to keep a supply ahead of the operator. Top of the parts bins is a flat working area. The slant-shelved sections are on a 30-degree angle to make the parts easily accessible to the worker



Reclaims Oil from Leaky Hydraulic Units

P. J. EYTALIS, Mechanics Universal Joint Div., Borg-Warner Corp., Rockford, Ill.

Loss of hydraulic oil from a leaking piston-rod gland has been reduced substantially by the use of a simple "collar" attachment that catches and returns the oil to the oil tank. Details of the attachment are shown in the above sketch.

This attachment is used temporarily and only in emergency, when shutting down a machine for necessary packing repairs would upset production schedules. The collar is clamped to the packing gland box easily and quickly. Reclaimed oil flows by gravity back to the tank. Different sizes are available for gland boxes of various diameters.

The cost of this attachment has proved negligible in contrast to the direct savings in oil and the indirect savings in machine downtime, not to mention the avoidance of dripping oil down the sides of the machine.

Safety Sleeves Protect Workers' Arms

A safety sleeve recently developed for glass cutters at the Mt. Vernon window glass plant of the Pittsburgh Plate Glass Company, has all but eliminated injuries caused by glass splinters or cracking of glass sheets. This safety device looks something like the familiar

solid sleeve worn by welders, but it differs in that it provides both ventilation and additional safety by incorporating grommets in the material.

The metal around the holes serves to deflect glass splinters away from the worker's arms, should a large sheet of glass suddenly break and crash down on him while he is handling it.

Cutters like the sleeves, which permit them to work in both comfort and safety.

•

Code Shows What Paints Are Best

Whenever any part of the plant is painted at Hamilton Watch Company, Lancaster, Pa., an inconspicuous code mark is made on the wall as a permanent record of the job.

This code shows by numerals the date of the job and, by an alphabetical symbol, the type of paint used. A file of the symbols in the plant engineer's office gives the name of the paint manufacturer and the specific grade of paint used.

A code entry reading "2-48-C," for example, means the job was done in February, 1948. The letter C identifies the name and manufacturer of the paint.

The same system is used when cleaning painted walls, to determine how various brands of paint stand up under repeated washings. No more need for complicated records, and no more guessing what paint is doing the best job.

•

Shipping Office Calls Truckmen by Signals

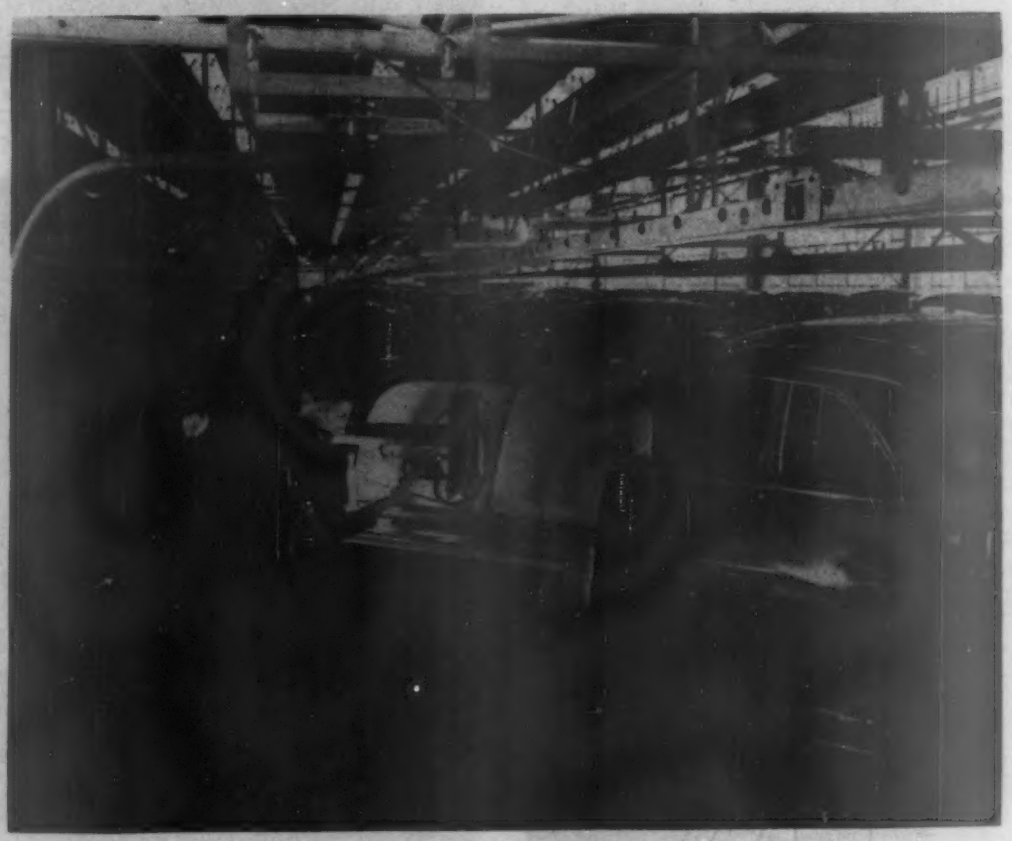
ROY MARKS, Maintenance Supervisor, Walter W. Moyer Company, Ephrata, Pa.

In a suburban manufacturing plant of this type, many outgoing shipments are handled by freight trucking carriers which pass the plant at scheduled intervals. At least six regular lines serve this plant, depending on the nature and destination of the shipment. Stops are made when a signal is shown for whatever carrier is wanted.

In order to simplify the signaling procedure, a series of letter signals has been set up at a plant window in a prominent position, easily visible from the road. Over each carrier's signal is an electric light which tells the carrier he is wanted.

A duplicate miniature signalbox arrangement is set up at the shipping foreman's desk, with a separate pushbutton switch for each carrier. Pushing the button lights both the light at the desk and at the window signal board. Hence the foreman is always sure the signal is on when he wants it to be.

A TRANSPARENT PLASTIC DISK, 12 inches in diameter, mounted about four inches above the welding point, is providing additional safety for the operators of spot welding machines at Servel, Inc., Evansville, Ind. It used to be that occasionally a worker would suffer eye burns from flying sparks. This problem has been entirely eliminated by the guard



Pneumatic Loader Eliminates Manual Handling

A pneumatic loader eliminates the need for manual handling of front seats at Fisher Body Plant No. 2, Flint, Mich. One man, with the loader, can now transfer a front seat from the overhead feeding conveyor line to its point of installation in the Chevrolet body.

Before, this job required two or three men. Often they would receive minor injuries. Now one man handles the seat efficiently and safely.

The front seats arrive at their point of installation by the conveyor line on one side and are placed in the car with the pneumatic loader. The loader can be pivoted through 180 degrees and can be moved back and forth between the seat conveyor line and the body line.

LOOKING AHEAD IN LABOR

Last-minute round-up as we go to press

TRUMAN'S surprise victory at the polls will hit management at the bargaining table next year. Organized labor didn't do the job alone, of course, but the Democrats admit the unions played a big part in upsetting Dewey. So there will be a payoff.

Here's how the labor leaders expect to cash in:

First, through a greater role—or voice—in running the executive branch of the government.

Then, in Congress, through junking Taft-Hartley in favor of something closer to the Wagner Act, and the enactment of other favorable legislation.

Later, with a fourth round of postwar wage increases.

That's the program for next year. Can the union leaders push it through? *Quite a bit of it.*

•

In Secretary Maurice J. Tobin, the union leaders have a strong friend in Truman's cabinet. He long has defended the closed shop. As all-out campaigner for Truman, he'll carry weight at the White House.

Tobin is the strongest advocate of organized labor to head the Labor Department. Already he's being criticized for his extreme partisan attitude. It may hurt his chances of getting back the Conciliation Service.

Labor's influence will not stop there. The trend is to the left again—a new New Deal. Union members and their friends will find more government jobs. And top union leaders will be consulted more often when decisions must be made affecting their interests.

On Capitol Hill, the labor leaders look for some trouble, but not too much. They expect Congress to be friendly, sympathetic. Not subservient.

Major demands on Congress: Repeal of Taft-Hartley, 75-cent minimum wage, social security improvements, low-cost housing, civil rights, extension of rent control.

Some action on all of them is probable. But the minimum wage boost may be held to 65 cents. And labor leaders might find more in a new labor law than they bargained for.

Passing a new labor law won't go too smoothly because there will still be a slight majority in both Senate and House of members who voted for the Taft-Hartley law. That won't save Taft-Hartley, however.

A majority in Congress will be against returning to the Wagner Act. So will Truman. What's in store is a new law—Thomas-Lesinski Act?—with something more than the Wagner Act and without Taft-Hartley's bite.

A substitute law will include repeal of Taft-Hartley (in name, at least). *That will save face for many Congressmen and carry out the Democratic platform pledge.*

In the new law, you'll probably find two proposals Truman urged on Congress before it passed Taft-Hartley: Curb on jurisdictional disputes and secondary boycotts.

There's general agreement that some way must be kept to cope with national emergencies. John L. Lewis would love to embarrass Truman next July—if not sooner. *Truman may want to keep the injunction as a club.*

To encourage more settlements in emergency disputes, the Congress may change the provision which limits inquiry boards to fact-finding. Labor leaders want recommendations, as under the railway labor law.

Here is the outlook on other parts of Taft-Hartley:

Closed shop ban: Elimination conceded.

Free speech: Likely to be retained for both employers and unions.

Non-Communist affidavits: Probably dropped, or else extended to employers, too.

Injunctions: For emergency use only.

Union political expenditures: Ardor for a third party has cooled off. AFL's Political League is now in business to stay, like CIO's PAC. They'll work with Democrats, probably get right to use union funds.

Elections: Most will go. Workers will only vote on picking a union, not kicking one out. The AFL will fight for retention of rights for craft unions.

Check-off: Need for signing up every year will end.

Welfare funds: Restrictions on their operation and use may stick.

•

All this adds up to tearing down Taft-Hartley and building up the Wagner Act. But that's not repeal.

You can figure on a fourth round. It's already under way. Secretary Tobin has led unions to expect it.

A fresh look at election results indicates the vote may have been more anti-Republican than against Taft-Hartley. Here's why: No Democrat who voted *for* the labor law got licked. Yet three Republicans from industrial areas who voted *against* the law also lost.

LOOKING AHEAD IN BUSINESS

Last-minute round-up as we go to press

WHAT'S ahead for consumer goods next year?

Many a businessman and many a business analyst are worried. They see soft spots cropping up. By looking too hard at these potential trouble spots, you can get very gloomy about the general business outlook.

The picture, however, is far from black:

1. In dollar volume, retail sales in 1948 will break all previous records—an estimated total of $130 billion. *In spite of higher prices, they will also break the record for physical volume by a shade.*

2. They will make this record-breaking performance in spite of the fact that people saved a much larger proportion of their incomes in 1948 than they saved in 1947. This means sales weathered a major adjustment because people saved more instead of buying things. It's healthy in the long run, however.

3. While retail sales as a whole have been rising, sales of various lines have had their own ups-and-downs. In general, durable goods lines—such as automobiles and building materials—hit new peaks. Soft goods lines in an impressive range, from men's apparel to drugs, ran into buyers' markets. *Even in these lines, however, dollar volume did not fall off. Usually it continued to rise, but more slowly than incomes were rising.*

4. Moving into 1949, retail sales and consumer incomes will be in much better balance than they were a year ago—*because they will be depending much less on the use of savings to boost sales.*

5. Ups-and-downs among various lines can be expected to continue next year. In general, though, they should be smaller. Most consumer goods lines have already geared themselves to normal markets, are going ahead at a level well above pre-war.

6. Barring some tremendous upset, such as war, or perhaps a national epidemic of major strikes, retail sales *as a whole* have a good chance to make a new altitude record in 1949.

•

There's one thing that stands out in the consumer goods picture. While 1948 brought major adjustments to most lines, production held up surprisingly well. In textiles, for example, cottons are slightly above last year. Wools are up. Rayon has gained substantially. And that in an industry repeatedly reported to be having trouble. Over-all consumer goods production will top 1947 by 6 per cent.

Prices, meanwhile, moved up about 6 per cent—but there were many "hidden cuts." Home appliances are being sold at discounts in some places; liquor stores have special low-price brands on display; more sheets and textiles are being sold as seconds. These are better values for the customer, but they are not fully reflected in the official cost indexes. *So, while the indexes show a rise of 6 per cent, chances are the rise is actually something less than 5 per cent.*

Looking ahead to next year, economists see retail sales rising as consumer incomes rise. And there's every prospect now that incomes will go up through the first half of the year.

•

Looking back on 1948, industry sees the year as the record-breaker of all record-breaking years:

EMPLOYMENT in industry hit new all-time highs. **In September some 45.9 million people were working in non-farm jobs—more than 50 per cent higher than the 1939 average. Manufacturing industries employed 16.6 million—more than 60 per cent above 1939. In the spring months, when business feels the full impact of military and foreign recovery spending, industry may need another million workers.**

WAGES advanced by 8.7 per cent in the manufacturing industries between October, 1947, and September, 1948. **Added to the first and second rounds, which were bigger, that brought the total post-war increase to 43 per cent. But, while rates went up more than 40 per cent, weekly pay of factory workers averaged only 30 per cent above VJ-Day level. A shorter work week and less premium pay accounted for much of the difference.**

A fourth round looms on the horizon. But, although the election returns added weight to labor's arguments, this round won't be as big as the third. Each round has been smaller. The first was 12.4 per cent on the average; the second, 11.2 per cent; the third, 8.5 per cent. With reports of layoffs again cropping up in some industries, with price resistance stiffening, and with food prices coming down, economists expect the fourth round to be 5 to 6 per cent.

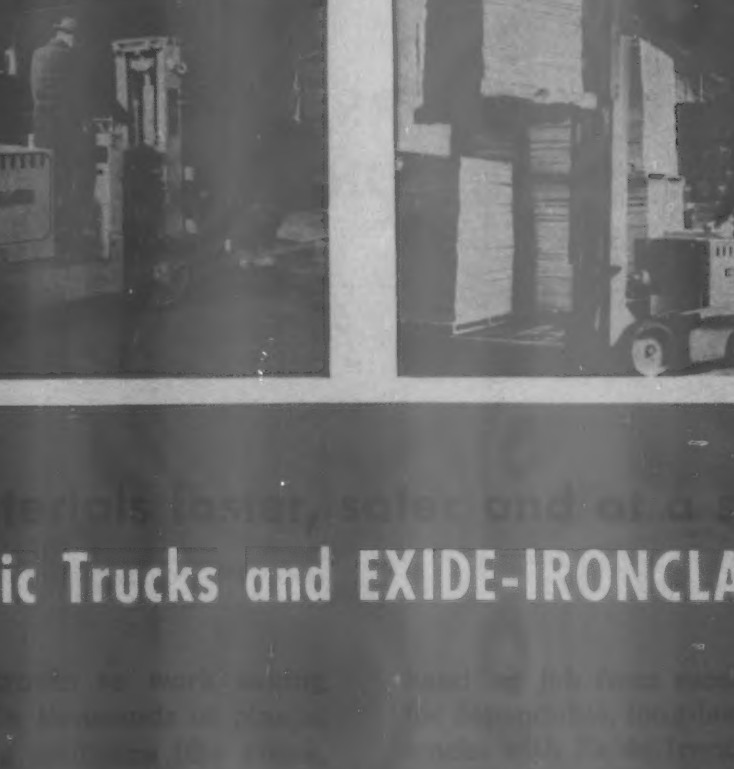
PRODUCTION meanwhile is bumping along under a ceiling imposed by manpower. **Industrial production, as measured by the Federal Reserve Board Index, was about 5 points higher in September than it had been a year ago. It stood at 192 per cent of the 1935-1939 average, as against 187 in the same month of 1947. With manpower still the limiting factor, it can't increase in 1949 much more than it gained in 1948.**

But, with all its bumps, 1948 adds up to the biggest peacetime year ever. And, because of the bumps, most business—is in a stronger position as it goes into the new year.

MERCURY FORK TRUCK

MERCURY FORK TRUCK

Battery Electric Trucks and EXIDE-IRONCLAD BATTERIES



1888...Dependable Batteries for 60 Years...1948

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • *Exide Batteries of Canada, Limited, Toronto*

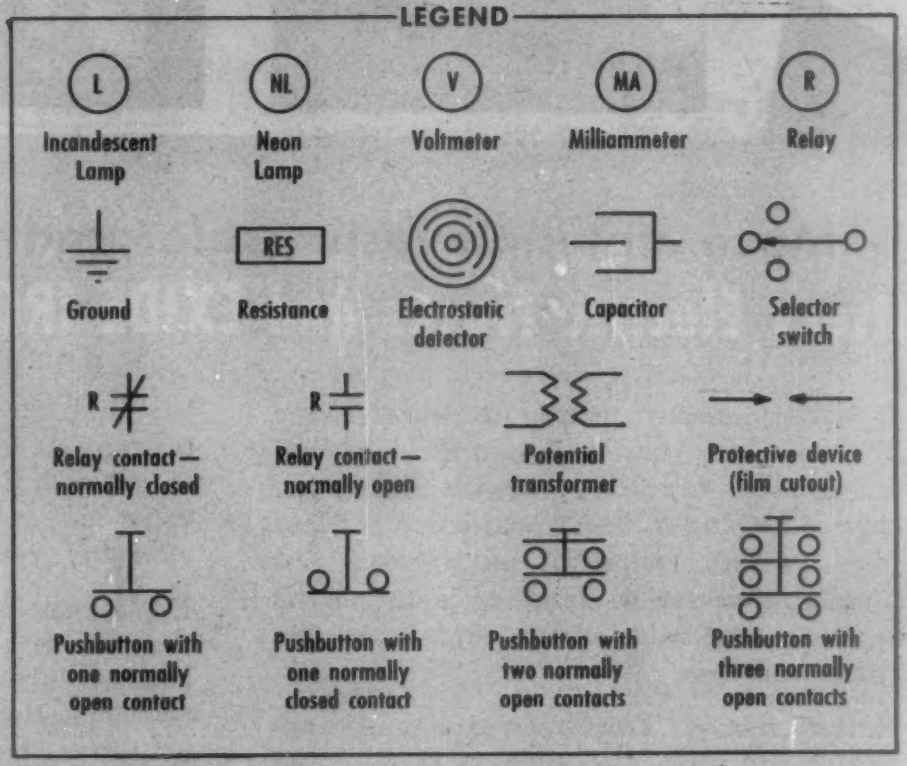
maintenance data sheet 155

GROUND DETECTORS FOR ELECTRICAL DISTRIBUTION SYSTEMS

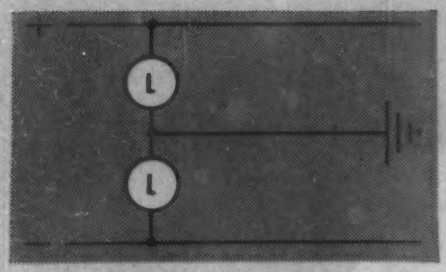
THE DIAGRAMS show some of the different methods of detecting grounds on normally ungrounded d.c. and single- and three-phase electrical distribution systems.

Ground detection systems vary greatly in cost and complexity, depending on the amount of information required, the type and reliability of the system, and the number of phases, with a.c. installations. Thus a ground detector may simply give a visual indication by means of lamps or meters; it may merely sound an alarm; or it may do both. And it may or may not indicate the grounded line or phase.

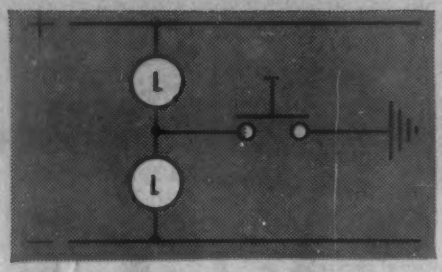
Selection of the most suitable and economical method of detecting grounds must be based on a careful study of all the conditions and requirements.



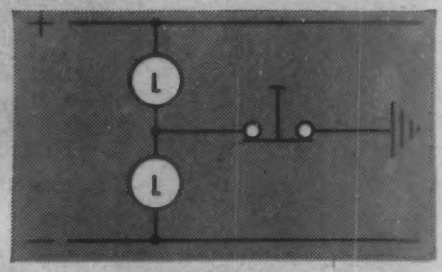
Ground Detection Methods Applicable to Ungrounded D.C. Systems



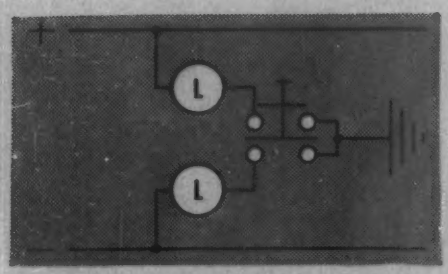
1. Lamps normally glow dimly. A ground is indicated when one lamp is bright, the other dark. The dark lamp is on the grounded polarity



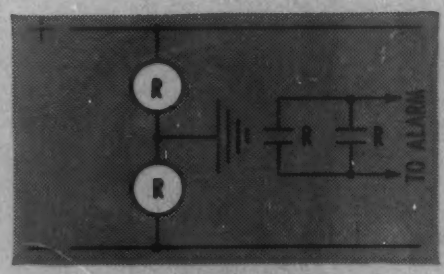
2. When the pushbutton is depressed one lamp will be bright, the other dark, if a ground exists. Dark lamp indicates grounded polarity



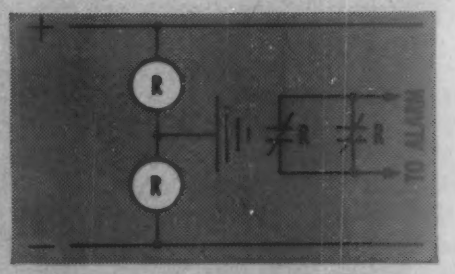
3. Depressing the pushbutton when either polarity is grounded will cause both lamps to glow dimly. Lamps can be checked in this way



4. When a double-contact pushbutton is used, the lamps normally are dark



5. Here overvoltage relays are used. When a ground occurs the relay in the ungrounded line receives line-to-line voltage and closes its contacts, to sound an alarm



6. These are undervoltage relays. Upon occurrence of a ground the relay in the grounded line will lose its voltage, close its contacts, and give an alarm

CONTINUED ON PAGE 134

Prepared by R. Loewe, Allis-Chalmers Manufacturing Company, Milwaukee

BEARING FAILURES DOWN... STEEL PRODUCTION UP

Sun Grease Increases Production by Cutting Bearing Failures 92%

Burned-out table roll bearings were causing loss of valuable production-time in a steel mill. The failures—as many as five a week—were due to the grease melting and running out as a result of heat reflected from the steel plates. Each bearing-replacement cost $80, not counting labor cost.

A Sun Engineer who was called in recommended a high-melting-point grease that had proved its ability under similar conditions.

With this Sun lubricant on the job, 92 percent of the bearing failures have been eliminated. A cash saving of about $18,000 a year has resulted, and additional economies have been realized from greater production, power savings, and lower grease costs.

Sun "Job Proved" lubricants are helping to increase production, and to cut maintenance costs, in every kind of industry. What they do for others, they can do for you. For full information, call or write your nearest Sun Office.

SUN OIL COMPANY · *Philadelphia 3, Pa.*

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SUN PETROLEUM PRODUCTS

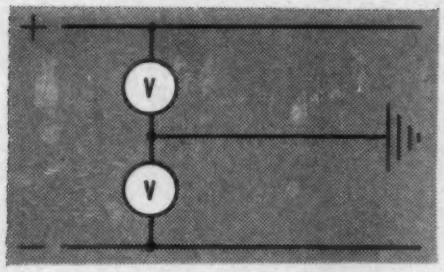
"JOB PROVED" IN EVERY INDUSTRY

SUNOCO

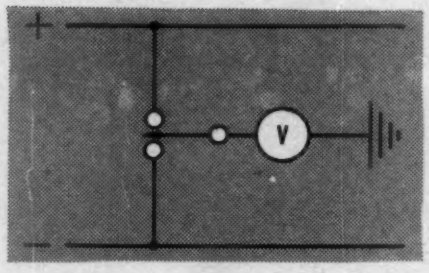
maintenance data sheet 156

GROUND DETECTORS FOR ELECTRICAL DISTRIBUTION SYSTEMS

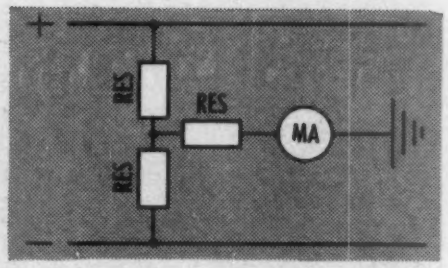
CONTINUED FROM PAGE 132



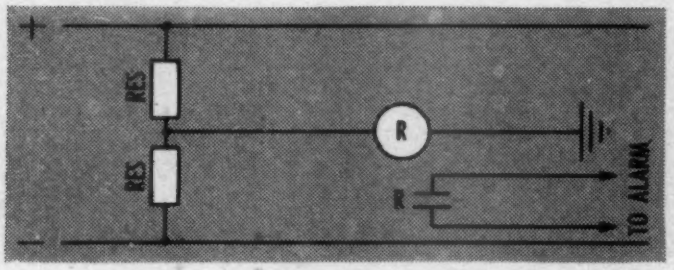
7. In this scheme voltmeters are used instead of lamps. The voltmeters normally show half the line-to-line voltage. If a ground occurs on either line, its voltmeter gives a lower reading, the other meter reads higher



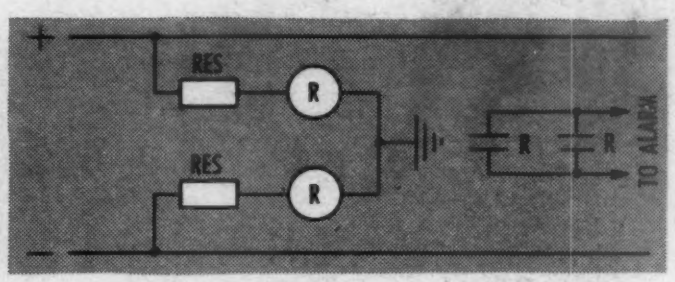
8. With the switch in the center position the voltmeter reads zero. When connected to the two lines in turn a ground will be shown by one reading (in the grounded line) being lower.



9. A milliammeter is used to detect the flow of ground current, but it does not show the polarity grounded. This meter must be protected by a resistor that will limit the current to a safe value



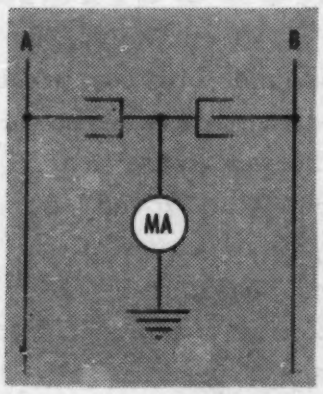
10. This arrangement is similar to that shown in Figure 9, except that a current-sensitive relay is used. Its contact will close and actuate an alarm when a ground occurs. The grounded line will not be indicated



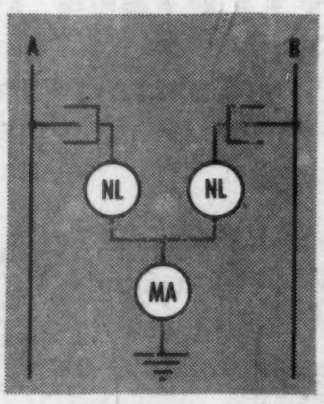
11. Two similar current relays with their contacts in parallel are used to actuate an alarm. The pick-up point for the relays must be less than the current normally flowing through the two relays when no fault exists. If a ground occurs the relay in the ungrounded line closes its contacts

Ground Detection Methods for Ungrounded Single-Phase A.C. Systems Up to 600 Volts

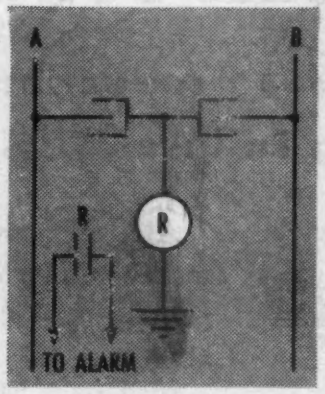
All the ground detection schemes shown in the preceding illustrations may be used. In addition the following methods are available. It will be noted that they make use of static capacitors for coupling and as voltage dividers, instead of resistors.



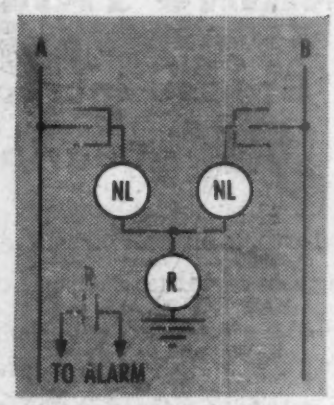
1. A milliammeter shows the existence of a ground, but does not indicate the grounded line



2. With two neon lamps connected as shown a ground will be indicated by a dark lamp. The lamp in the ungrounded line will glow at full brilliance



3. Similar to Figure 1, except for the use of a current-sensitive relay in place of the milliammeter. Upon the occurrence of a ground the relay contacts will close and actuate an alarm, but grounded line will not be shown

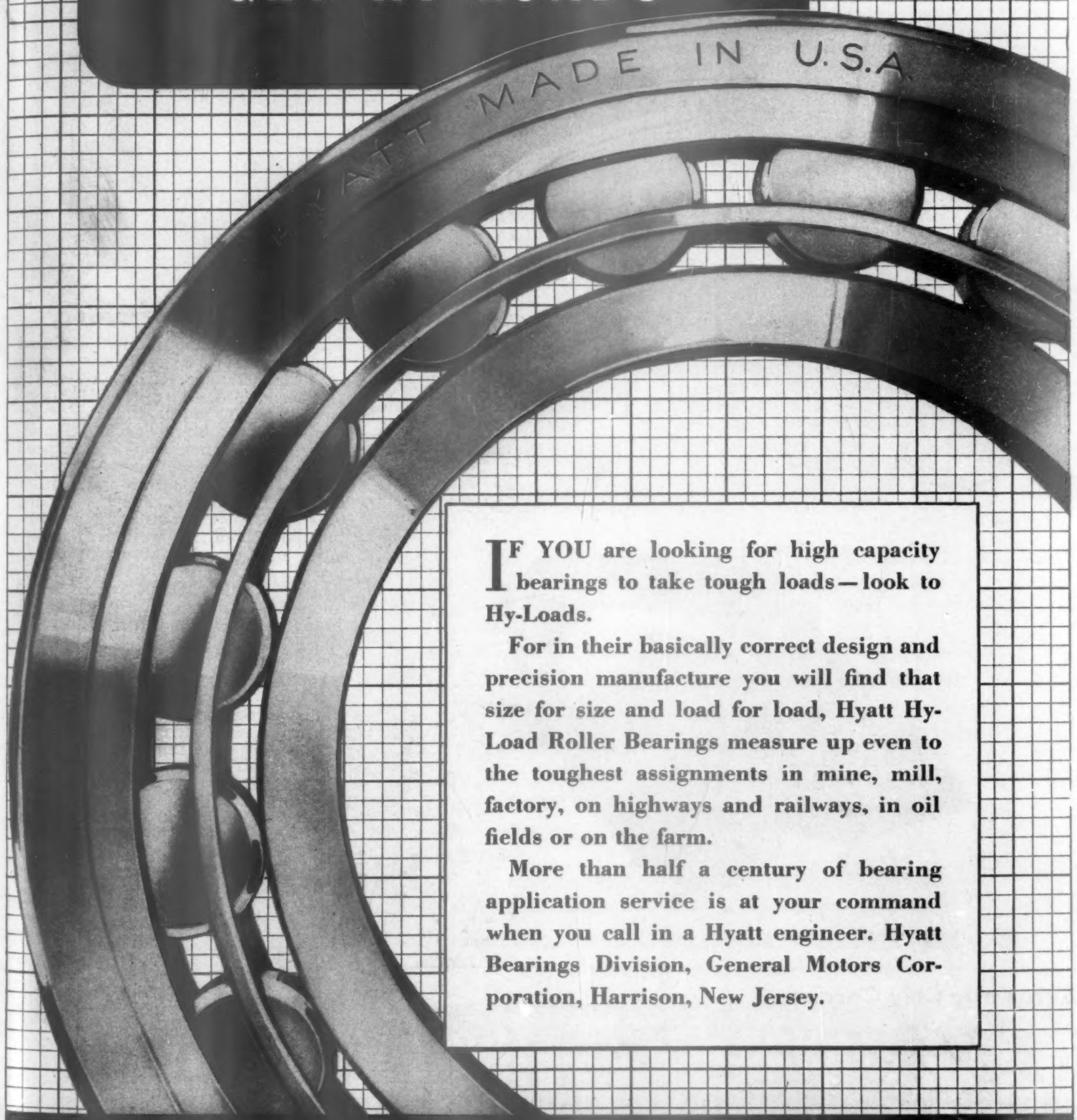


4. Here neon lamps are used, as in Figure 2. The relay will actuate an alarm and a dark lamp will indicate the grounded line

Additional data sheets on "Ground Detectors for Electrical Distribution Systems" are scheduled for January, 1949, publication

Prepared by R. Loewe, Allis-Chalmers Manufacturing Company, Milwaukee

FOR TOUGH LOADS GET HY-LOADS



IF YOU are looking for high capacity bearings to take tough loads—look to Hy-Loads.

For in their basically correct design and precision manufacture you will find that size for size and load for load, Hyatt Hy-Load Roller Bearings measure up even to the toughest assignments in mine, mill, factory, on highways and railways, in oil fields or on the farm.

More than half a century of bearing application service is at your command when you call in a Hyatt engineer. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

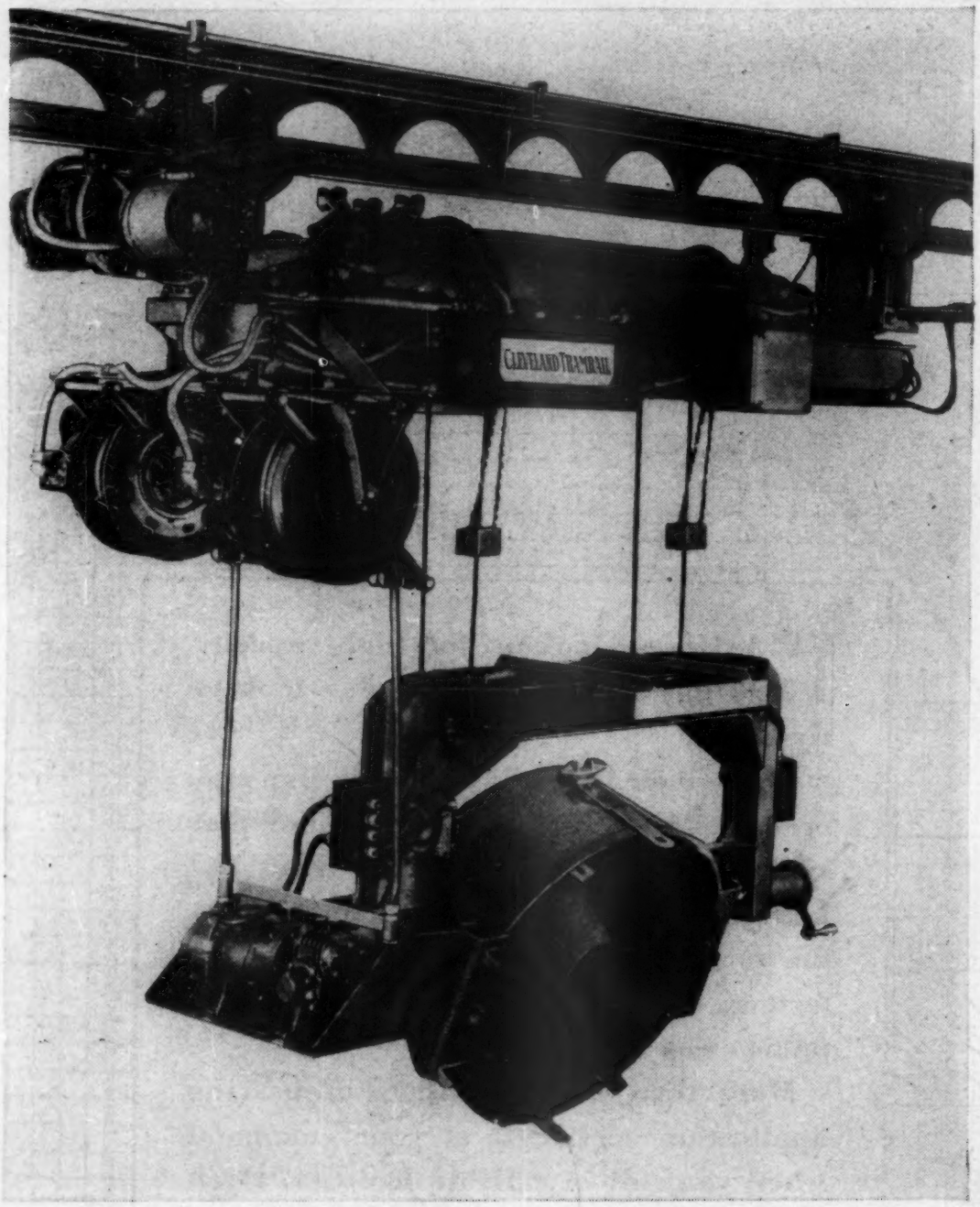
HYATT ROLLER BEARINGS

WHAT'S NEW IN EQUIPMENT

Briefed here—for the convenience of plant operating men—are descriptions of industrial plant equipment newly placed on the market

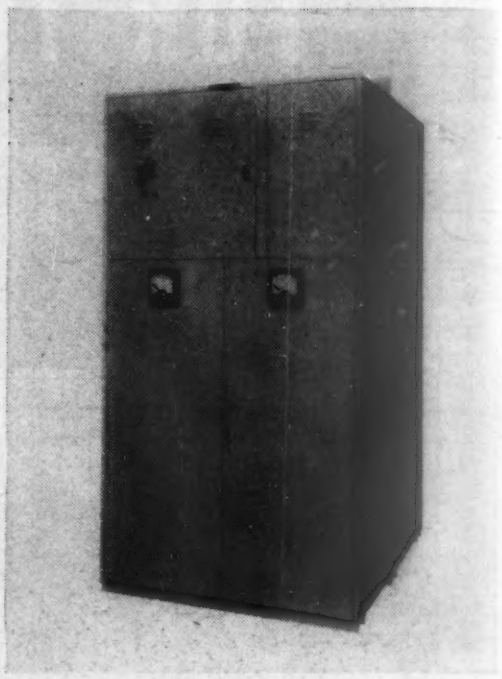
Rotating Shaft Seal

Designed to prevent leakage of liquids or gases along a rotating shaft when under pressure or vacuum, seal, called Roto-Flex, has three main components. The rotating member, an integral unit, is held by a compression spring against the fixed surface. Operating conditions of the application for the seal determine the amount of spring pressure necessary and the material to be used. Suitable for circulators, pumps, speed reducers, and similar equipment. Double unit, two rotating seals mounted on opposite ends of the compression spring, is also available; designed for use where the liquid being sealed cannot act as a lubricant or coolant, and a separate liquid supply is admitted into the sealed chamber. Gits Bros. Mfg. Co., 1846 Kilbourn Ave., Chicago 23.



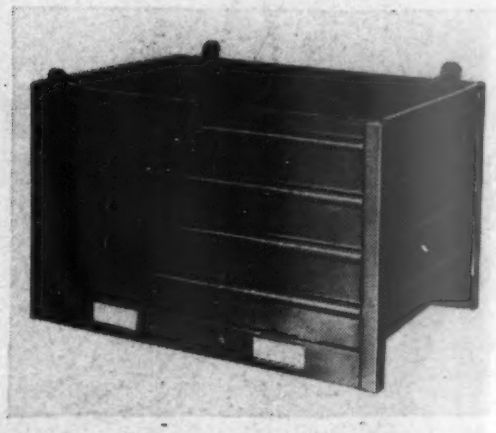
Automatic Chip Carrier

For transporting baskets of metal chips from oil extractor to any one of a number of storage bunkers, overhead carrier delivers, empties by turning the basket over, and returns automatically, with one man at the extractor and handling all operations. Baskets are of approximately 15-cu.-ft. capacity, take 1000 pounds of chips. A dial selector, located above the crank, allows preselection of any station to which the load is dispatched. Three motors, for the hoist, the carrier travel, and the basket roll-over. Two cable pick-up reels; one for power to the roll-over motor, the other for control circuits. Travel speed of carrier is 200 f.p.m. Cleveland Tramrail Division, The Cleveland Crane & Engineering Co., Wickliffe, Ohio.



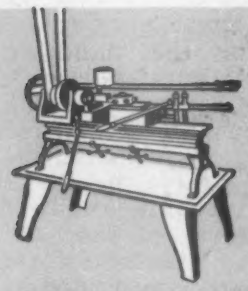
Low-Voltage Controller

Line of low-voltage metal-enclosed controllers for use with a.c. motors up to 800 horsepower (at 550 volts) and for d.c. motors up to 350 horsepower (at 230 volts) is designed for controlling squirrel-cage, wound-rotor, synchronous, or multi-speed motors. Suitable for use with pumps, mixers, grinders, mills, and similar drives. Controllers include in one unit starting, stopping, and controlling equipment, as well as a draw-out air circuit breaker which provides adequate short-circuit protection (either 25,000 or 50,000 amps). Serving also as a circuit isolating device, the draw-out air circuit breaker is interchangeable, thus preventing production delays when servicing is necessary. Dead-front metal enclosures are 90 inches high and can be lined up with other control and switchgear equipment, or placed beside the machine. General Electric Co., Control Div., Schenectady 5.



Corrugated Scrap Box

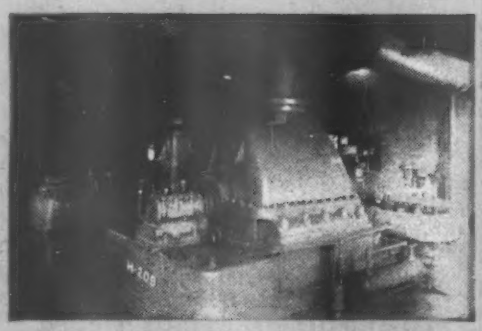
Corrugated boxes for use with revolving-head fork trucks are designed for the handling of scrap or



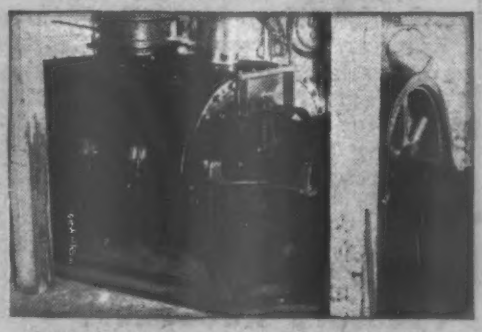
The first successful turret lathe and the first Roots Blower were built in the same year . . . 1854. We're not good because we're old, but old because we're good.

THE FIRST POUND OF IRON WAS MADE WITH AIR

(Photograph by courtesy of Inland Steel Company, from their motion picture "The Drama of Steel".)



Battery of five big R-C Centrifugal Multi-stage Boosters and Exhausters in a midwestern steel plant.



According to recollection of oldest employees at foundry where this R-C Rotary Positive Blower is installed, it's been giving dependable service for more than 38 years.

For the earliest melting of iron ore, air was supplied by crude, man-power bellows. Today, with a ton of pig iron requiring 2,500 pounds of air, high-capacity, power-driven blowers do the work.

This requires the greatest care in selecting blowers matched to the job. One reason for the frequent specification of Roots-Connersville equipment is our 94-year record for reliable performance.

Another important factor is R-C *dual-ability* to supply either Rotary Positive or Centrifugal units. We are unbiased in our recommendations of whichever type best meets the service demands. Roots-Connersville is the only blower builder giving you this *dual choice.*

For large capacities or for small, built-in applications, as low as 5 CFM, consult R-C *dual-ability* for your blower needs.

ROOTS-CONNERSVILLE BLOWER CORPORATION
812 Central Avenue, Connersville, Indiana

ROOTS-CONNERSVILLE
ROTARY CENTRIFUGAL
BLOWER BUILDERS R-C SINCE 1854
BLOWERS · EXHAUSTERS · BOOSTERS · LIQUID AND VACUUM PUMPS · METERS · INERT GAS GENERATORS

★ ★ ONE OF THE DRESSER INDUSTRIES ★ ★

forgings for dumping. Slots at two sides permit handling in dumping operations. Square corners allow use of full interior box space, permit conservation of floor space in stacking. Boxes are all-welded steel construction, manufactured to customer's specifications. Palmer - Shile Co., 16007 Fullerton Ave., Detroit 27.

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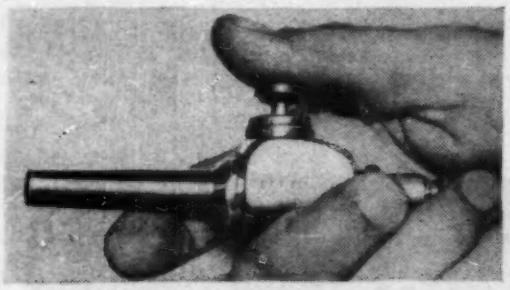

Springless Air Valve

General-purpose air hose valve and nozzle is suitable for use on any air line up to 100-p.s.i. pressure. It is opened by a thumb-actuated plunger that rolls a stainless steel ball out of its seat, and down out of the stream. When the plunger is released, the ball returns to the seat. Seal is positive, packless, O-ring type,. Available for ⅛- or ¼-in. hose. Standard nozzle extends approximately 2½ inches; longer nozzle may be obtained on order. Paul Valve Corp., 683 Third Ave., New York 17.

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Canvas Belting

For use in conveying-transmission, canvas belting is inner-stitched and lock-stitched. Separate plies of duck form an inner core over which the cover is stitched. Different types are available for different uses, each type impregnated with preservative compounds suitable to the specific application. Made in widths from 1 to 54 inches, in numbers of plies ranging from 4 to 10. C. R. Daniels, Inc., 624 West Adams St., Chicago 6.

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Canopy Cutter

Hand punch, No. 657 canopy cutter, is designed to cut fluorescent fixture canopies. It was developed for use with manufacturer's 500 or 700 raceway. The Wiremold Co., Hartford 10, Conn.

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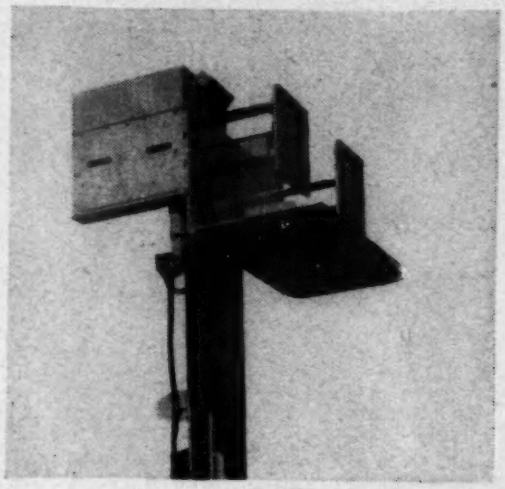

Drum Handling Attachment

Twin pusher attachment, for use on manufacturer's Skylight electric fork truck for the handling of metal drums, is equipped with high-pressure hydraulic operation and individual pushbutton controls. Rams can be used independently or simultaneously. Unit includes its own motors and pumps, can be detached by the removal of four bolts, and replaced by standard forks. An overhead guard is provided to protect the operator. Automatic Transportation Co., 149 West 87th St., Chicago.

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Paint

Quick-drying traffic paint, called "Onerete," was developed for marking factory aisles, storage areas, and danger zones. It dries in approximately 5 minutes after application at 75 deg. F., or over. It can be sprayed on with marking equipment, and is available in yellow, white, and black. Other colors can be developed on request. Lowebco, Inc., 1525 East 53rd St., Chicago 15.

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Sandblast Helmet

Outer hood of sandblast helmet is made of neoprene covered Fiberglas with vulcanized seams, to provide resistance to abrasive materials, light weight, and flexibility. Self-adjusting, knitted elastic neckpiece is attached to inner rubberized cape, which may be removed by a zipper to permit cleaning. Built around manufacturer's "Hard Boiled Hat," the helmet has a full-floating hammock and sweat band, both removable, wide web, six-point headpiece suspension to distribute the weight. Ventilation across the facepiece is provided to prevent lens fogging. Standard equipment includes a laminated lens and a clear cover glass, a screen faceplate cover for shot-blasting, belt, break-valve, and connecting hose. Weighs approximately 6 pounds. F. D. Bullard Co., 275 Eighth St., San Francisco.

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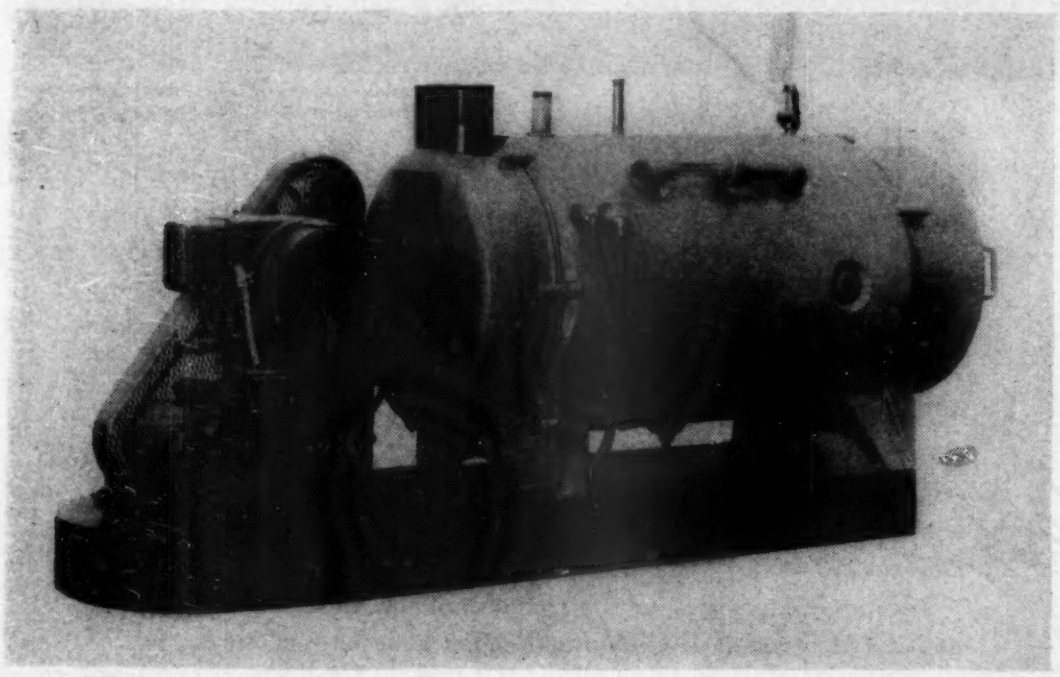

Hot Water Generator

Developed to meet the need for high capacity hot water heating, hot water generator is available in two sizes, 550,000 B.t.u. output, or 665 g.p.h. at 100-deg. rise, and 730,000 B.t.u. output, or 875 g.p.h. at 100-deg. rise. The units are automatic and available in oil- or gas-fired models. Four-pass construction of the hot water generator shell is said to provide high heating efficiency; exhaust gases are carried away by a vent attached to an existing chimney. A hinged rear door provides accessibility for cleaning and maintenance. The generator shell, including the tubes, is completely galvanized; outside of the shell is covered with a thick insulation jacket. All units are equipped with safety controls. Dimensions of the large generator are 113x44x26½ inches. Front end of the base, including the burner, can be removed for separate handling where required. Cleaver-Brooks Co., 326 East Keefe Ave., Milwaukee 12.

Temperature and Pressure Recorders

Line of gas-filled temperature recorders and recording pressure gages includes recorders with one, two, three, or four pens. Temperature tube systems feature stainless steel, Heli-Arc welded construction with

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FIELD ENGINEERS AND OILITE BEARING DEPOTS IN PRINCIPAL CITIES

spiral springs. Manufacturer states that the standard bulb design is arranged so that it can be converted in the field into any of the usual apparatus connections. Industrial Instrument Corp., 311 North 17th St., Philadelphia 32.

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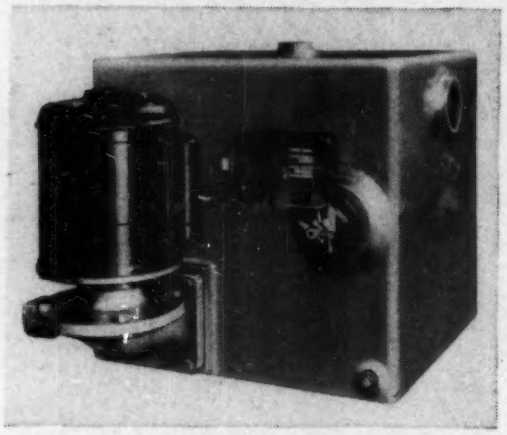

Small Condensation Pump

Known as the 4100 Series, condensation pump is rated to handle any capacity up to 6000 square feet E.D.R. (9 g.p.m.) against a discharge pressure up to 20 pounds. Motor, pump, float switch, and drain plug are accessible from the front for inspection and servicing. By removing four capscrews, the entire motor and impeller assembly may be lifted from the pump housing without disconnecting piping. Disassembly of the unit is accomplished with two hex keys and an open-end wrench. Two-piece bronze impeller is fitted with an oversize carbon type rotary seal which runs on the impeller hub to protect the motor shaft from corrosion. Capacitor-start ¼-hp. dual voltage motor is vertically mounted above the pump. Condensate is collected in a 15-gal. steel tank with built-in strainer. Levels are controlled with a non-corroding float set to a single-pole float switch. Sterling, Inc., 3742 North Holton St., Milwaukee 12.

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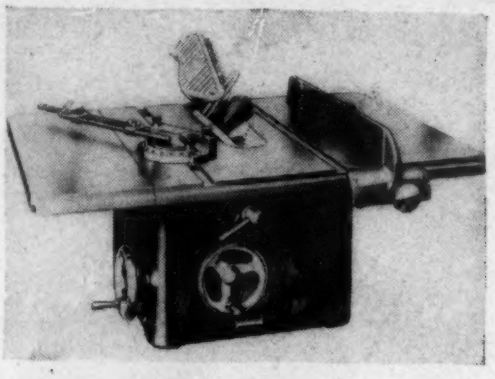

Tilting Arbor Saw

Constructed from cast iron, 8-in. tilting arbor saw, B-4400, has a 18x24-in. table with a removable insert. Saw blade is 7 inches from front of table. The ⅝-in.-dia. spindle has "sealed-for-life" ball bearings, and the rip fence is adaptable to either right or left hand. The saw tilts 45 degrees, gives 2⅝-in. cut. Miter gage with 24-in. extension arm also provided. Foster Mfg. Co., Kinsey Ave., Buffalo 17, N. Y.

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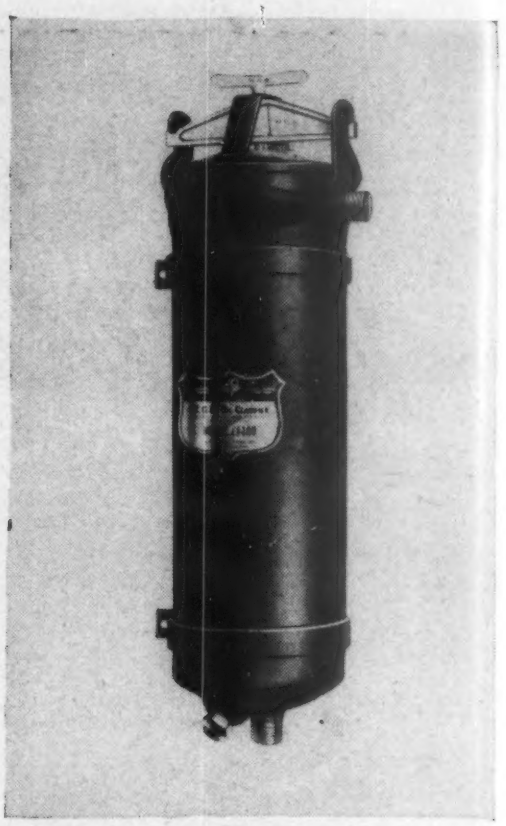
Roller Bearing Unit

Said to be self-aligning, roller bearing units are designed to maintain adjustment in 0.005-in. increments on small units, and 0.007-in. on the larger units. Permanent self-aligning "Z" seal is said to provide for radial float. Housing is provided with drilled and counterbored holes spaced 30 degrees apart, a self-tapping screw, and a key to lock the unit in the required position. Available in cartridge, flange, take-up, four-bolt pillow blocks, and flange cartridge units. Shafer Bearing Co., 801 Burlington Ave., Downers Grove, Ill.



Oil Clarifier

Multiple purpose filter for lubrication or fuel oil clarification, designated the C. T. Clarifier, employs a replaceable filter cartridge which can be changed without the use of tools. It is an outside-to-center filter, with a filtering area of approximately 272 square inches when used for lubrication oil, and 238 square inches when fuel cartridges are used. When utilized for fuel oil, the governing orifice is removed to allow free flow, and fuel oil cartridges are used. W. G. B. Oil Clarifier, Inc., Kingston, N. Y.

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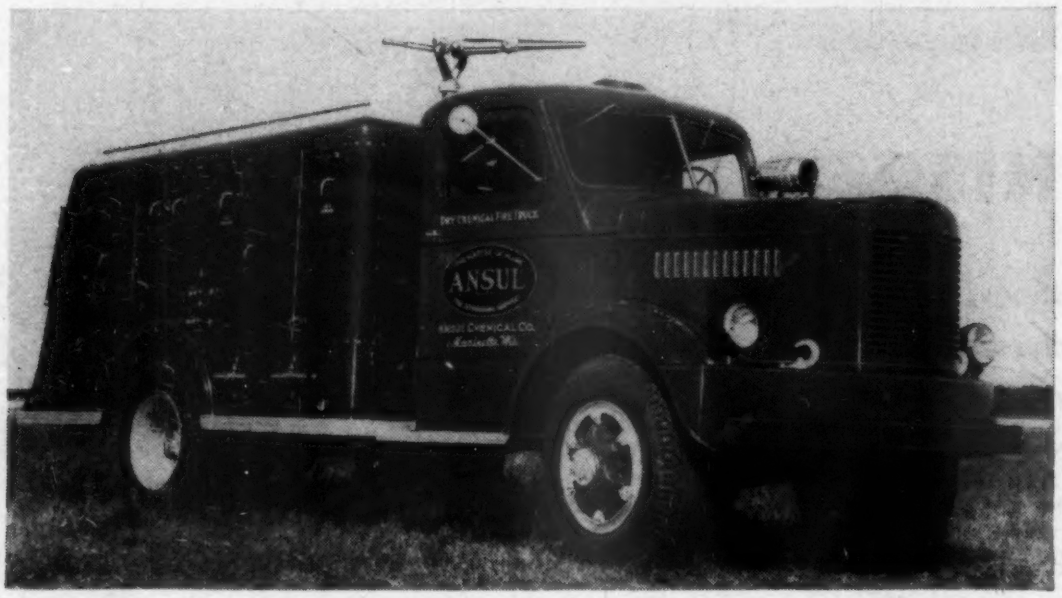

Fire Truck

Fire truck, which uses dry chemical as the primary extinguishing agent, is suitable for use wherever severe flammable liquid fire hazards exist. Twenty-eight hundred pounds of dry chemical and 250 gallons of water are carried on the truck. Fully loaded, the vehicle weighs 21,500 pounds. It is 95¾ inches wide and 21½ feet long. Cab height is 8 feet, turret height, 10½ feet. Truck has four-wheel drive, five forward speeds and one reverse. Maximum governed speed is 62 m.p.h., although the governor can be removed if greater speed is required. Four extra compartments on the sides of the truck house accessory fire and rescue equipment. Fire Extinguisher Div., Ansul Chemical Co., Marinette, Wis.

Over-All Fluorescent Lighting Fixture

Molded lightweight destaticized plastic is used to make fixtures which can be assembled into a rigid, level suspended ceiling that is said to provide uniformity and abundance of soft, shielded light. Called the Leaderal Louvered Light Ceiling, it may be installed over complete areas, and is unlimited in size, because the unit can be expanded endlessly. Tie-rods of various lengths are available so that the illuminated ceiling can be installed at any height below the structural ceiling to which the lamps are attached. Leader Electric Co., 3500 North Kedzie Ave., Chicago 18.

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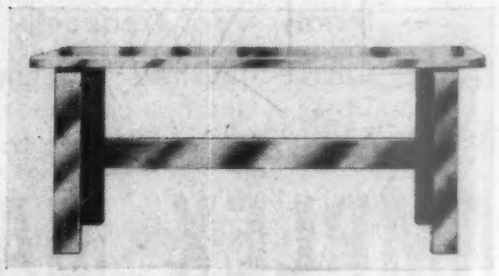

Steel Workbench

Heavy-duty steel workbench made with an 11-gage steel top and 13-gage steel channel-type legs, reinforced with cross members, is 32

Rolling Steel DOORS

Manually • Mechanically • Power Operated

No other door offers the manifold advantages of the Rolling Steel Door . . . their vertical action requires less space—both inside and outside of the building. Being constructed entirely of steel, they require virtually no maintenance, and they provide more positive protection throughout a lifetime of trouble-free service. Every architect wants to provide doors which embody all of these advantages in their most modern form. A study of Mahon Rolling Steel Doors—details of their construction and materials used—will reveal why they continue to gain favor among architects and building owners throughout the world . . . you will find, in Mahon Rolling Steel Doors, the latest developments in doors of this type . . . more compact and more practical operators, embodying exclusive Mahon features which are proven advantages in every-day operation. See Mahon's Insert in Sweet's File for complete information.

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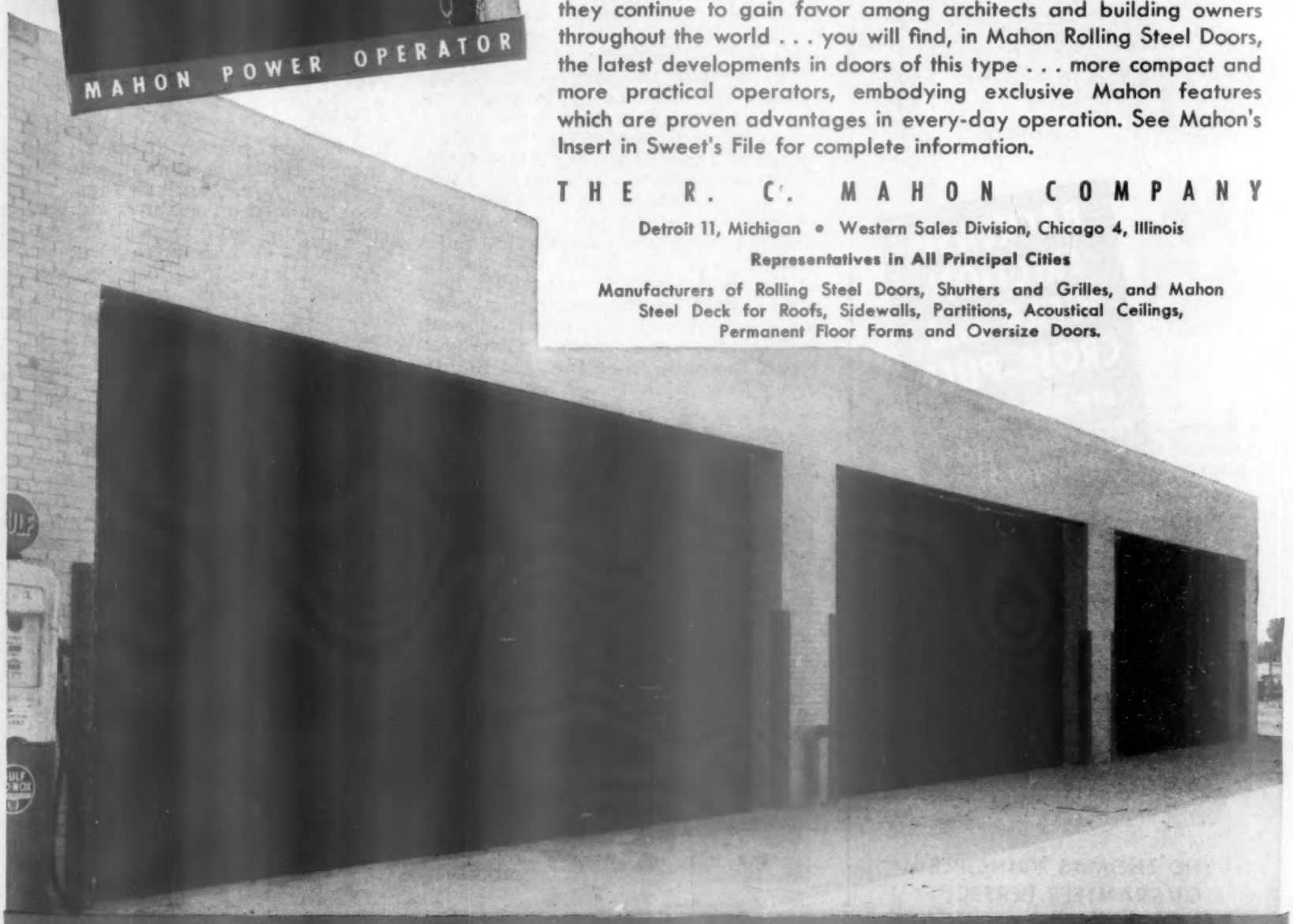
Manufacturers of Rolling Steel Doors, Shutters and Grilles, and Mahon Steel Deck for Roofs, Sidewalls, Partitions, Acoustical Ceilings, Permanent Floor Forms and Oversize Doors.



ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Three Mahon Power Operated Rolling Steel Doors, 26′ x 12′-6″, Recently Installed in the New Plant of Peninsular Metal Products Corp., Detroit, Michigan.

MAHON

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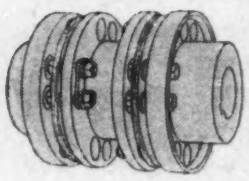
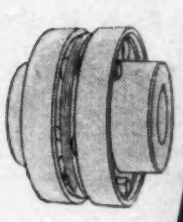
Engineered to stand up on the toughest jobs, Thomas Flexible Couplings do not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.



The standard line of Thomas Couplings meets practically all requirements. But if unusual conditions exist we are equipped to engineer and build special couplings.



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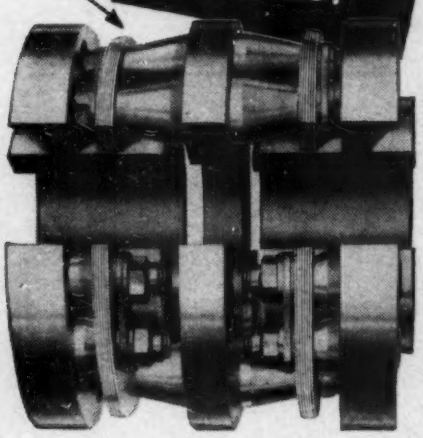

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THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

inches high, 28 inches wide, 72 inches long, and weighs 150 pounds. Benches are shipped in individual cartons, with necessary nuts and bolts. Tri-State Metal Products, Inc., Box 1513, Pittsburgh 30.

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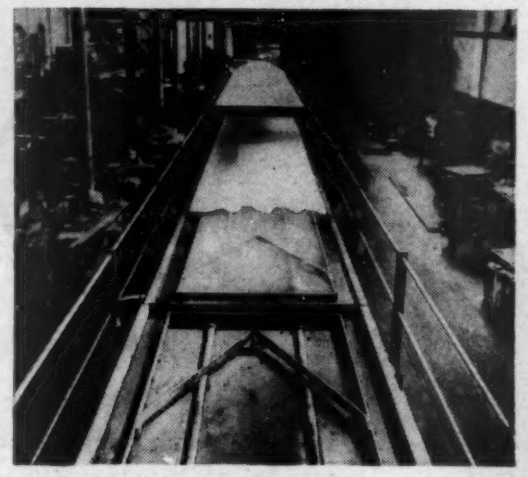

Cooling Conveyor

Designed for cooling and handling of gelatin, pitch, grease, synthetic resins, meta-silicate of soda, and other chemicals, conveyor carries molten products on a flat stainless steel belt supported by water. This design provides direct coolant contact with the under side of the steel belt, so that the molten products poured onto one end of the conveyor can be taken off in strip form at the opposite end, according to manufacturer. Tapered rubber strips fitted to the edges of the belt hold the liquid on the belt surface. Entire conveying band runs in a metal duct through which a suction fan pulls filtered cool air. Width and length of the belt, speed of operation, and temperature of the cooling or heating medium may be varied to meet individual applications. Conveyor Dept., Sandvik Steel, Inc., 111 Eighth Ave., New York 11.

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Battery Charge Indicator

Designed for use in industrial trucks to prevent battery operation in an over-discharged condition, charge indicator shows the momentary charge condition of the battery. The dashboard mounted instrument reports the state of discharge at any instant, instead of after the over-discharge zone is reached. Four different-colored sections indicate the state of the charge. A series of resistors and taps permit adjustment for 3-, 6-, 12-, 15-, 16-, 18-, and 24-cell batteries. A toggle switch disconnects the instrument from the battery during charge. Manufacturer states that the indicator is tamperproof. Gould Storage Battery Corp., Trenton 7, N. J.

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Hand Cleanser

Waterless hand cleaner, called Little Doc Disolvit, removes grease, dirt, paint, rubber cement, tar, shellac, carbon, tinner's dope, buffing compounds, and similar substances, without irritating the skin, according to its maker. Compound contains lanolin, no ammonia. Available in pints, quarts, gallons, and 5 gallons. Schaffner Industries, Inc., Pittsburgh 2.

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Heavy-Duty Platform Truck

Heavy-duty platform truck, called The Freighter, is available in seven platform sizes with either nicro-steel, molded-on cushion rubber, or Durastan resinoid wheel. Weights of trucks in various sizes range from 167 to 242 pounds. Features include welded steel axle housing on the running gear, 16-in. load wheels, and casters with Zerk fittings for pressure grease lubrication. Capacity of the truck with nicro-steel wheels is 5000 or 6000 pounds, depending on the caster model chosen. With molded-on cushion rubber wheels, the capacity is 2960 or 2680 pounds. Available in level type, with two load wheels on end and two swivel casters on the other end, or tilt type with two load wheels at center of truck and one swivel caster at center of each end. The Rapids-Standard Co., Inc., Dept. S-132, 342 Rapistan Bldg., Grand Rapids 2, Mich.

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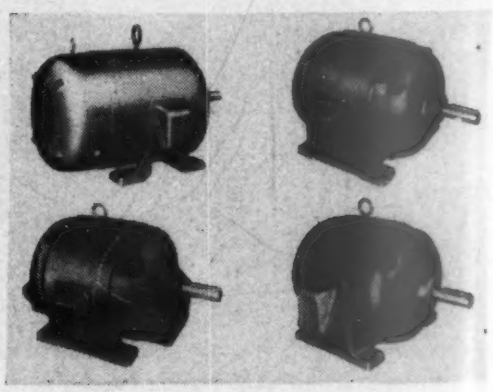
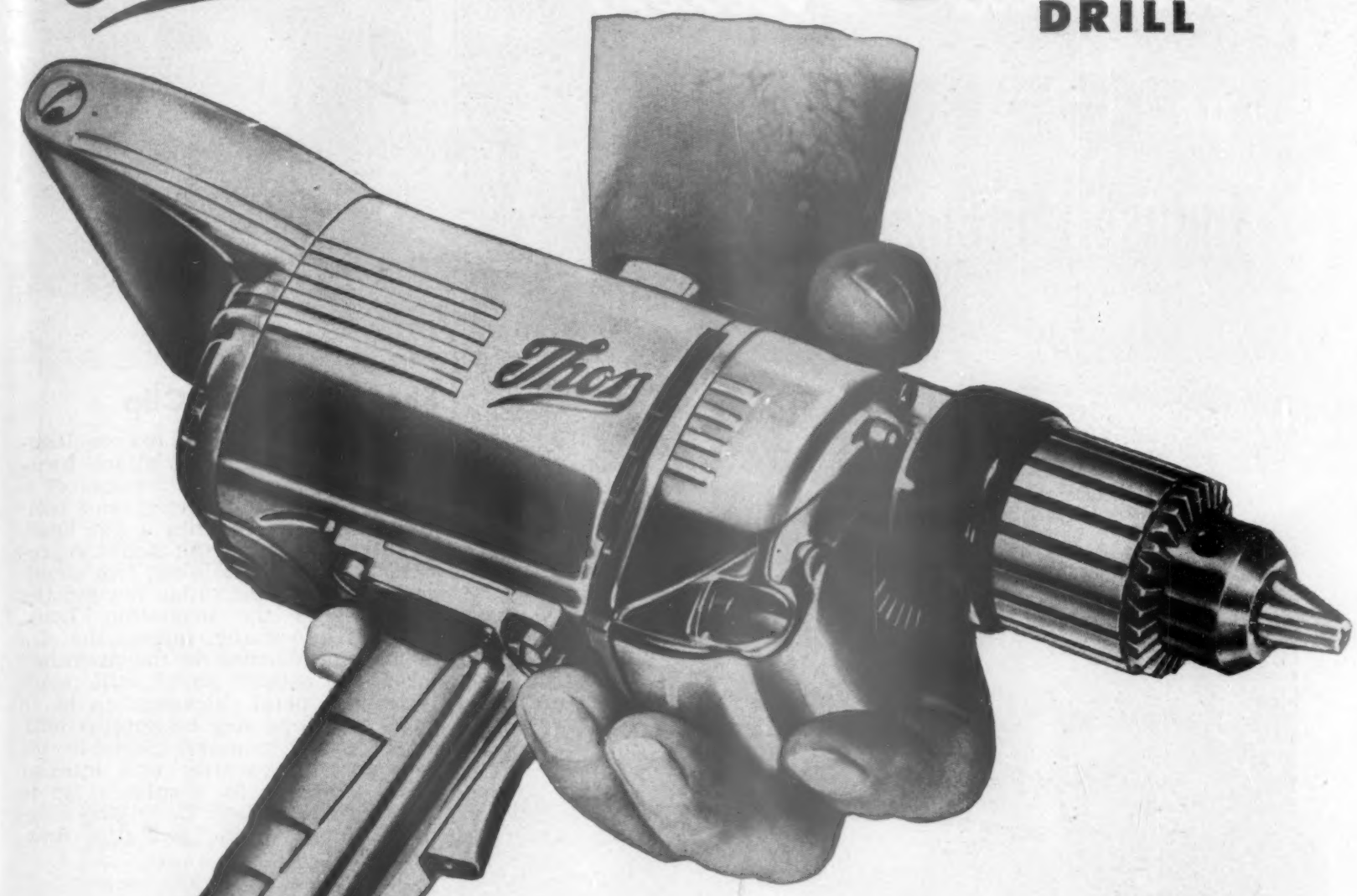


Electric Motors

Line of electric motors includes integral horsepower sizes from 1 to 300, with polyphase ratings in all commercial frequencies. Available in drip-proof, splash-proof, totally en-

Thor ANNOUNCES THE ½" Silver Line DRILL



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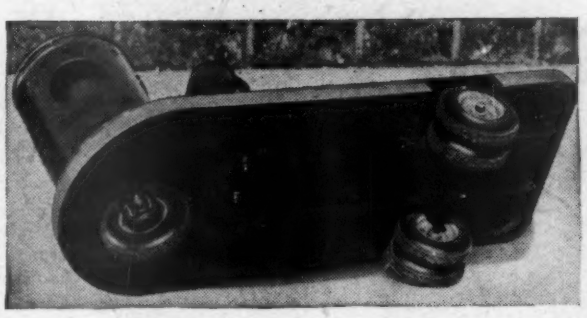

The most modern of the new materials handling equipment is being supplied with General Industrial Pneumatic tires. Available in complete assemblies of wheel, tube and tire, or tire alone.

The GENERAL TIRE

THE GENERAL TIRE & RUBBER CO.
Akron, Ohio

closed fan cooled, and totally enclosed non-ventilated models. Electro-Dynamic, Division of the Electric Boat Co., Bayonne, N. J.

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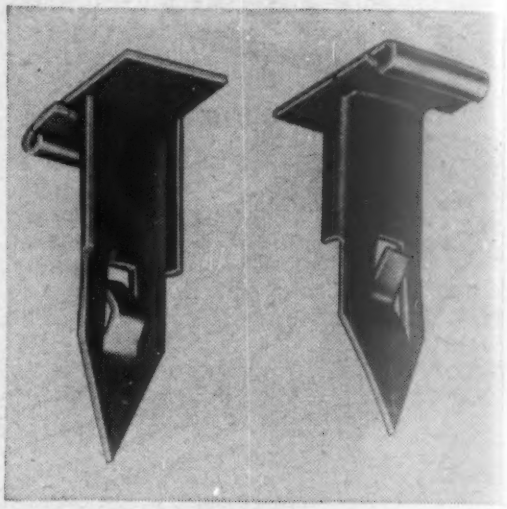

Sheet Insulation Clip

Fastening, called the Lexfuco Insulation Clip, designed to attach insulation to sheet metal, consists of a sharply pointed, hardened and tempered steel shank with a flat head. Slightly rounded shank is said to provide strength for driving; two shoulders prevent penetration beyond the thickness of the insulation. Lock, stamped into shank, fastens the clip in place. According to the manufacturer, the pointed shank will penetrate any metal thickness up to 18 gage, and clips may be applied with an ordinary hammer. Suitable for use on both exterior and interior work, available for insulation up to 1 inch in thickness. Lexington Supply Company, 125 Lexington Ave., Cleveland.

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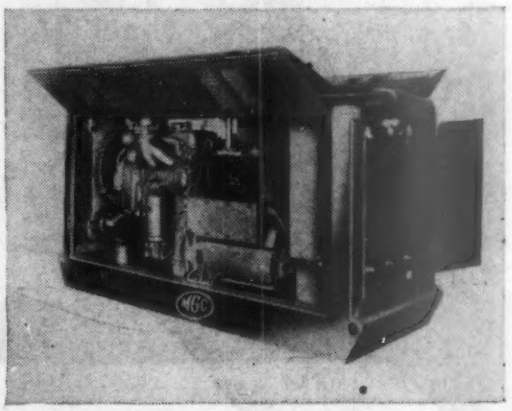

Engine-Driven Power Plant

Line of MGC engine-generator sets includes generators for use with both alternating and direct current. Each set is self-contained, equipped with controls, radiator, fuel tank, and weatherproof canopy, and wired ready to put into service. Those with a.c. output are available in single or three-phase, 50 or 60 cycle, in sizes from 5 to 60 kw. They are of the revolving-sealed type, with a direct-connected exciter and built-in automatic voltage regulator. The d.c. generators are the compound-wound interpole type, directly connected to the engine by a flanged coupling, available in sizes from 5 to 60 kw. Both a.c. and d.c. generators up to 25 kw. are available with gasoline engines. Units with 20- to 60-kw. ratings have diesel engines;

K&M "Century" Asbestos Corrugated

for long life without maintenance...

The "new" roof on this industrial building is actually more than 3 decades old! A coal operator installed these "Century" Asbestos Corrugated sheets on a coal tipple 33 years ago before he re-used them here.

for modern architectural effect...

Beauty in typically modern style is brought to this store with a facade of "Century" Asbestos Corrugated. This beauty will *last* without any painting or other expensive upkeep.

You've probably noticed that "Century" Asbestos Corrugated is growing in popularity for decorative motifs... inside and outside... for industrial plants, stores, restaurants, theaters. There's a rugged attractiveness in the simplicity of the corrugations and neutral light-gray coloring.

And perhaps it's no news to you that "Century" Asbestos Corrugated is thoroughly practical from the *structural* point of view. It actually *toughens* with age. Never needs to be painted. Can't rot, corrode, catch fire, or succumb to termites.

NEW "TOP-SIDE" FASTENERS CUT ROOFING COSTS

On top of all this, you can specify the new "TOP-SIDE" Fasteners, and cut a big slice off the cost of roof installation over steel purlin construction. Exclusive with "Century" Asbestos Corrugated, these new fasteners permit roofing to be done entirely from *atop the roof* ... eliminating entirely the costly labor and scaffolding normally required beneath. This feature, alone, is worth looking into—write us for full details.

Nature made Asbestos...

Keasbey & Mattison has made it serve mankind since 1873

KEASBEY & MATTISON

COMPANY • AMBLER • PENNSYLVANIA

DIAMOND ANNIVERSARY 1873 1948 K&M KEASBEY & MATTISON CO.

"COOLIE" CONVEYING IS COSTLY

Yes, "coolie" conveying is costly because it takes so much manpower to reach modern production capacity levels. If you're using manpower in material handling — you're using a "coolie" system. Conveyors keep manpower on the production line! Investigate Standard Conveyors to handle pieces, parts, units, assemblies, cases, cartons, boxes, barrels, bales, bundles, packages — everything from mail to malleable iron castings! There's one to meet your needs in shop or warehouse. Standard Conveyor Co., General Offices: North St. Paul 9, Minn. Sales and Service in Principal Cities.

FREE HELPFUL LITERATURE

Send for Standard's Catalog. See how conveyors are used in every field of industry. Ask for Bulletin No. FM-128

Standard GRAVITY & POWER CONVEYORS

they are suitable for stationary, portable, or standby service to furnish light and power. Motor Generator Corp., Hobart Square, Troy, Ohio.

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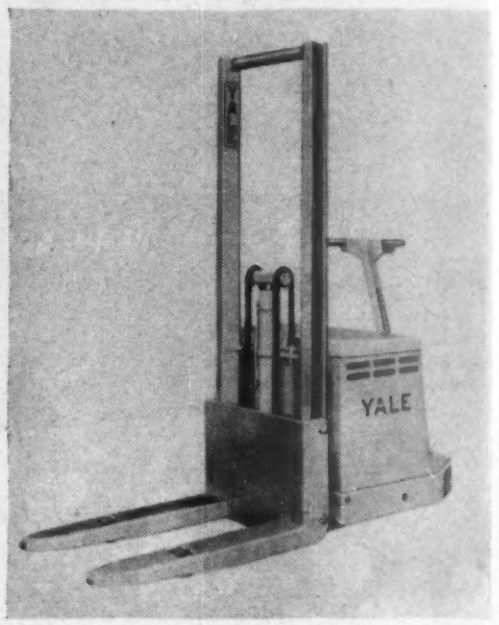

High-Lift Pallet Truck

Electric pallet truck, 2500-lb. capacity, is battery-operated both for travel and for lifting loads. It is 39x31 inches in over-all dimensions, not including the fork, and lifts pallets 66 inches for overhead tiering. Its small size permits use in confined areas, and 83-in. mast permits access to motor trucks and freight cars. Truck and battery weigh 1965 pounds. The Yale & Towne Manufacturing Co., Materials Handling Division, Philadelphia.

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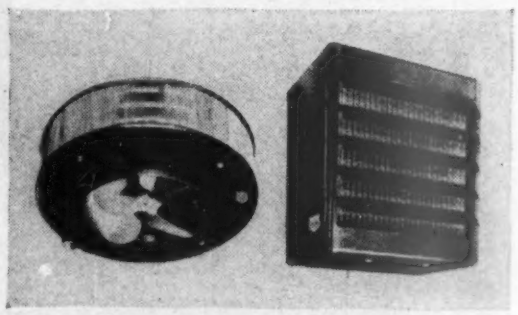


Unit Heaters

Two unit heaters, in horizontal and vertical models, are made for use with either steam or hot water heating systems. The horizontal model, designed for mounting along a sidewall, or from the ceiling, is available in 16 sizes, with heat output ranging from 24,000 to 240,000 B.t.u. per hour. The vertical model, which blows air downward, is designed for ceiling mounting. It is available in 28 sizes, providing heat output ranging from 37,200 to 492,000 B.t.u.'s per hour. U. S. Radiator Corp., 300 Buhl Bldg., Detroit.

•

Swivel Hanger

Fixture stud of swivel hanger, Type SSH, carries the weight of extra-heavy lighting installations, according to its manufacturer. The hanger is available for use with either a ½- or ¾-in. hub for pendant fixtures, with 1½- to 4-in. deep concrete boxes,

ENGINEERED IN PLASTICS BY GENERAL ELECTRIC

Bull's-eye for Plastics

● Plastics score a hit in this unusual application! Stocks for the new Hy-Score target pistols are molded in plastics by General Electric for the Hy-Score Arms Corporation, Brooklyn, N.Y. Called the world's most powerful air pistol, the Hy-Score requires a sturdy stock that will stand up under shock, resist perspiration and grease. G. E. selected a plastics that meets these specifications, then molded the stocks in four distinctive color patterns.

What is *your* plastics problem? Whether you sell pistols or perfume, General Electric's *complete* plastics service may help you lower production costs, improve your product. General Electric, world's largest manufacturer of finished plastics parts, is equipped to design, engineer, and mold plastics products to meet your individual requirements.

Write us for more information. Or get in touch with your nearest G-E Sales Office. We'll be glad to consult with you on any plastics job. Meanwhile, write for your free copy of the illustrated color booklet, "Problems and Solutions in Plastics." Address: Plastics Division, Chemical Department, General Electric Company, 1 Plastics Avenue, Pittsfield, Mass.

G-E COMPLETE SERVICE—AT NO. 1 PLASTICS AVENUE

Backed by 54 years of experience. We've been designing and manufacturing plastics products since 1894. General Electric research facilities have expanded continually, working to develop new materials, new processes, new applications for plastics parts.

No. 1 Plastics Avenue—complete plastics service—engineering, design, mold-making. G-E industrial designers work with our engineers to create plastics parts, sound and good looking. Skilled mold-makers in G-E toolrooms average over 13 years experience.

All types of plastics. Compression, injection, transfer and cold mold facilities . . . high and low pressure laminating . . . fabricating. G-E Quality Control—a byword in industry, means as many as 160 inspections and analyses for a single plastics part.

GENERAL ELECTRIC

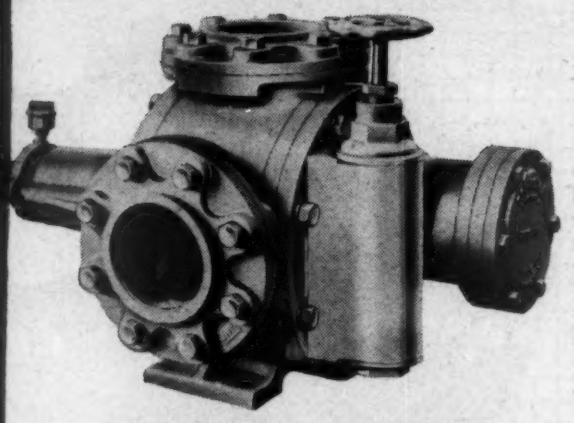
CD48-A9L

General Electric plastics factories are located in Scranton, Pa., Meriden, Conn., Coshocton, Ohio, Decatur, Ill., Taunton and Pittsfield, Mass.

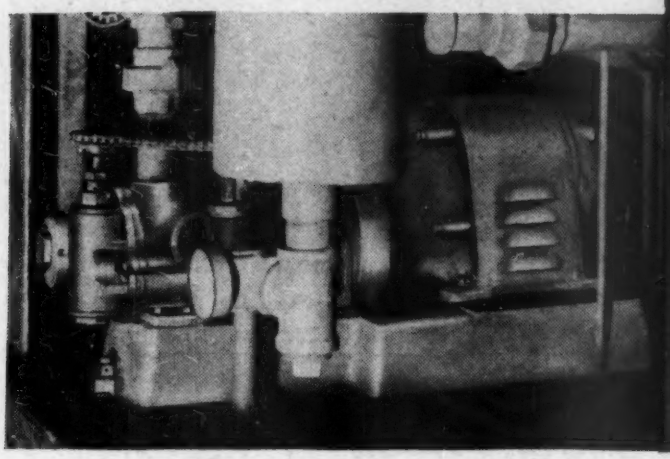
Here's Another User

UNITED STATES GYPSUM COMPANY

Here's the Pump



Here it is in use



and here's why

Yale & Towne TRI-ROTOR is Industry's choice for so many pumping jobs

In its plant at Philadelphia, United States Gypsum Company uses TRI-ROTOR pumps by Yale & Towne because these are the *only* modern low-pressure pumps that combine the *power economy* of a rotary with the *positive handling* and *product protection* of a piston type pump.

LOW MAINTENANCE COST—ONLY 3 MOVING PARTS

Handles wide variety of liquids—volatile to viscous. No over-heating, chewing, foaming, or agitating.

With only 3 moving parts (two pumping members) you are assured of low maintenance cost.

Optional and interchangeable; Variable Volume Control (with or without Manual Flow Control), Integral Relief or By-Pass Valve, Solid Head.

New: Pressure Regulator Device permits operator to adjust hydraulic mechanism to control both volumetric capacity and discharge pressure without stopping the unit.

Sizes: 5 to 200 gpm for a wide variety of industrial applications.

ECONOMICAL—*Rotary Action*... PROTECTIVE—*Piston Action*...
ONLY YALE *GIVES YOU BOTH IN ONE PUMP*

Wire or mail your requirements to Pump Department,
THE YALE & TOWNE MFG. CO., 212 Henry St., Stamford, Conn., U. S. A.
The Yale & Towne TRI-ROTOR Pump is now in use pumping such products as these (check applications which interest you)

☐ Alcohol	☐ Fish Oil	☐ Lacquer	☐ Shortening
☐ Caustics	☐ Gasoline	☐ Liquid Soap	☐ Silicate of Soda
☐ Chocolate	☐ Glucose	☐ Molasses	☐ Solvents
☐ Coolants	☐ Greases	☐ Oils	☐ Starch
☐ Corn Syrup	☐ Ink	☐ Paint	☐ Varnish
☐ Edible Oils	☐ Honey	☐ Propane	☐ Viscose

NAME.....

COMPANY.....

CITY..... Zone ..... State

TRADE YALE MARK

Pump Department of
THE YALE & TOWNE MFG. CO.
Stamford, Conn., U. S. A.
Representatives in Major Cities

Makers of the Famous Lines of Locks, Hardware, Hoists and Industrial Trucks

or with 1½- or 2⅛-in. deep, 4-in. octagonal outlet boxes. An extension piece is provided for use on 2½- to 4-in. deep concrete rings with bottom plates having a ⅜-in. stud. Furnished with steel covers for either 4-in. octagonal boxes or concrete rings. Appleton Electric Co., 1701-59 Wellington Ave., Chicago 13.

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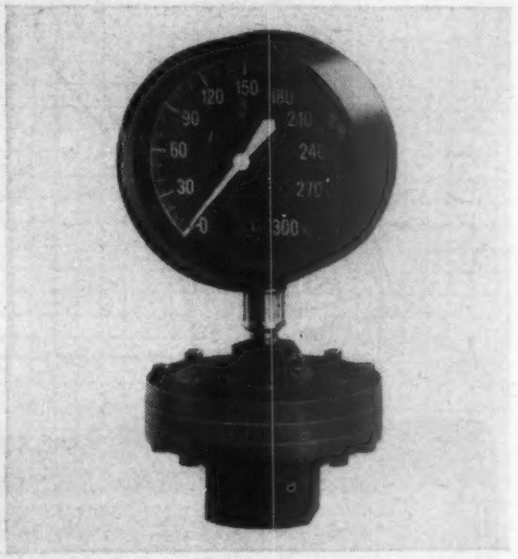


Pressure Gage

Suitable for use with chemicals and other viscous liquids which either corrode or clog the Bourdon tube of a standard pressure gage. Diaphragm of Teflon according to the manufacturer, makes possible its use for vacuum and for compound ranges, as well as for pressures as high as 1600 p.s.i., and for temperatures up to 300 deg. F. Removable bottom part and diaphragm rings may be obtained in cast iron, bronze, steel, stainless steel, Hastelloy, lead-coated iron, and monel. Helicoid Gage Division, American Chain & Cable Co., Inc., Bridgeport, Conn.

•

Condensate Return Unit

Intended for use with heating systems, 20-gal. packaged condensate return unit, Type UA, is said to return condensate to the boiler at a high temperature to maintain steady heat and minimize fuel losses. Unit is automatic; includes turbine-type pump, motor, receiver tank, float switch, a strainer, piping, and base in the assembly. Requires 5 square feet of floor space. Equipped with bronze liners and impeller. Roy E. Roth Co., Rock Island, Ill.

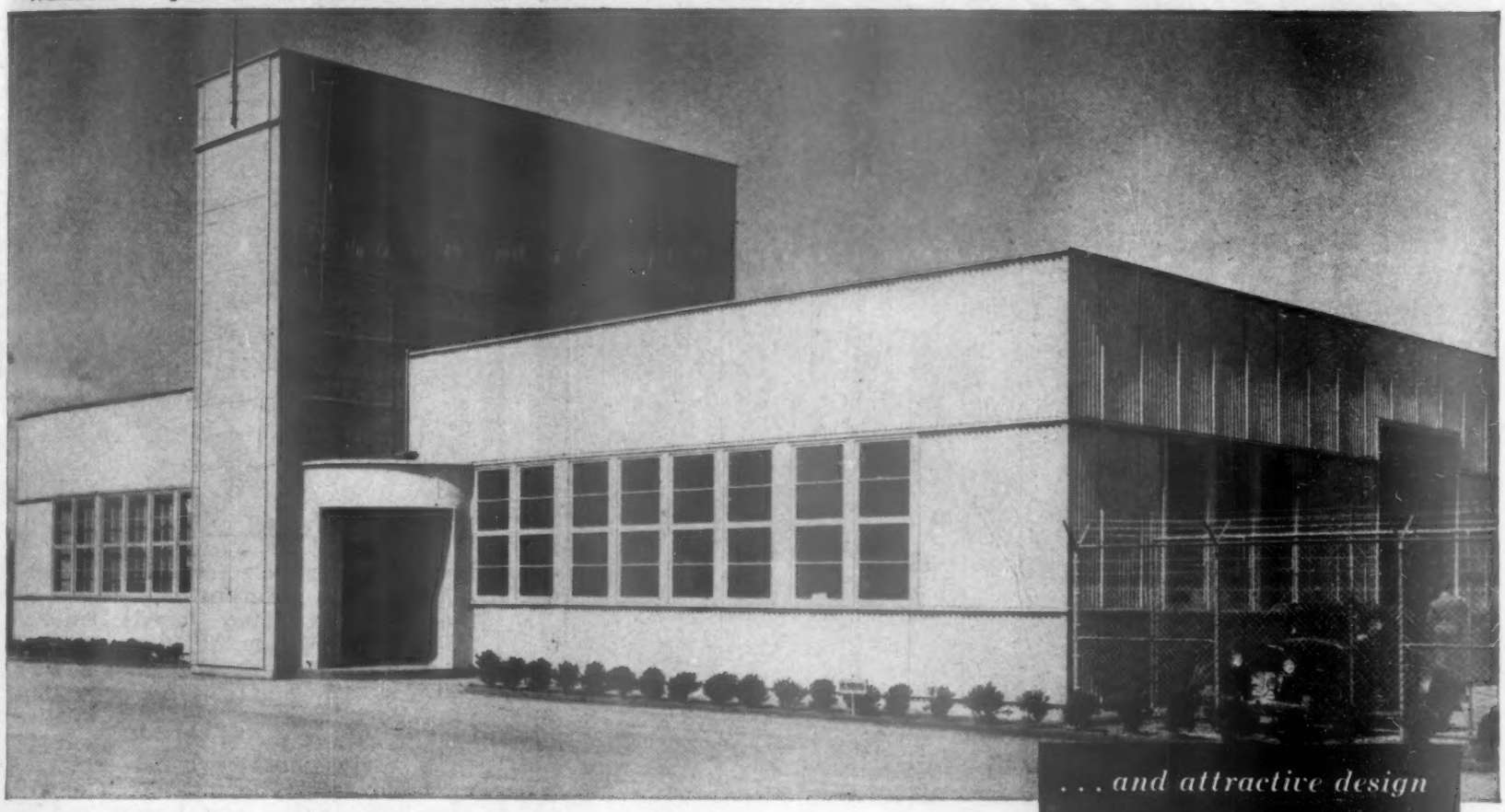
•

Horizontal Conveyor

Designed for horizontal handling of cartons, boxes, bags, parts, and similar material, power belt conveyor, named Power-Veyor, is available in belt widths of 8, 12, 14, and 20 inches, and is built for permanent or semi-permanent installations. Unit consists of a drive section, with motor and drive pulley; intermediate sections of gravity conveyor; and a take-up section. Sections are available in two types—with rollers projecting above the channel frame; and with rollers below the channel frame. Additional conveyors may be coupled to the unit with tear-drop brackets and a shaft available on order. Various types of belts are available for spe-

CORRUGATED TRANSITE* ... *for functional simplicity*

*Transite is a registered Johns-Manville trade mark



... *and attractive design*

Maintenance-free . . . low in cost . . . can't rot . . . can't rust . . . can't burn. Use on walls or roofs.

TAKE ADVANTAGE of Johns-Manville Corrugated Transite to streamline and beautify your construction design.

Low in cost and adaptable to every type of modern building, Corrugated Transite offers a way to save money both on construction and maintenance.

The large fireproof sheets—with their unusual strength increased by corrugations—permit a minimum of framing. Quickly installed, they require little or no upkeep. They're made of asbestos and cement, practically indestructible materials.

Attractive stone-gray in color, Transite can be used alone or in combination with other building materials. And when need for alterations arises, the sheets are practically 100% salvageable.

For more facts, send for brochure. Johns-Manville, Dept. FM-12, P. O. Box 290, New York 16, N. Y.

JOHNS-MANVILLE JM PRODUCTS

EASY TO BOLT TO STEEL

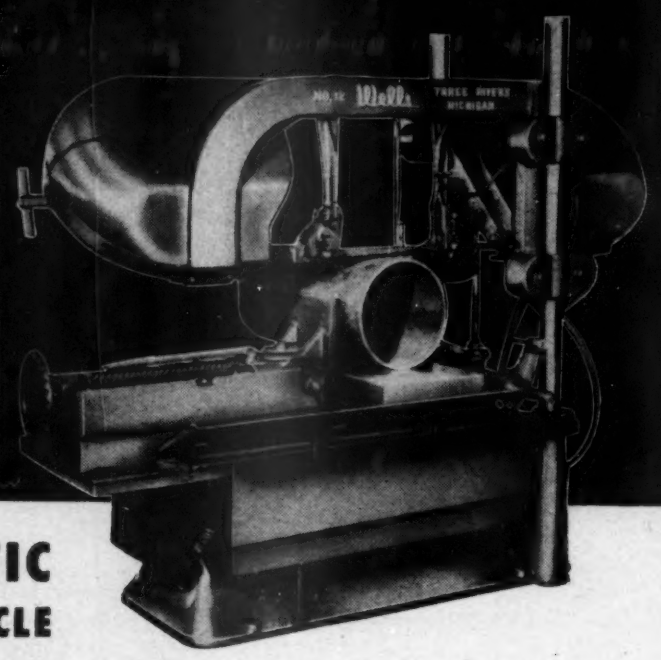
EASY TO SAW

EASY TO DRILL

EASY TO NAIL TO WOOD

Johns-Manville *Asbestos* **CORRUGATED TRANSITE**

Now available
with wet cutting system . . .
the
WELLS
No. 12
METAL CUTTING
BAND SAW
featuring



AUTOMATIC
CUTTING CYCLE
and
CONTROLLED BLADE PRESSURE

DESIGN DETAILS

- Cutting action parallel to bed.
- Easily controlled depth cutting.
- Automatic frame return and blade motor shut off.
- Large capacity—12" x 16", rectangular; 12¾", rounds; die blocks: 12¾" deep, 16" wide, 18" clearance bed to blade.
- Selective speeds: 50, 90, or 150 ft. per min.
- Ample power: ¾ H.P. blade motor, ⅓ H.P. hydraulic system motor.
- Weight: approximately 1845 lbs.

The heavy duty, hydraulically operated Wells No. 12 Metal Cutting Band Saw, with automatic cutting cycle and special blade pressure controls, is now available with a NEW time and money saving extra—the Wells wet cutting system. This complete self-contained system permits safe use of higher f.p.m. cutting speeds and increases blade efficiency. Installed as an integral part of the saw, the system includes chip pan, fluid tank, centrifugal type pump unit, screened intake, splash guards, and flow control valve. Ask your Wells Saw Dealer for full information or write direct to the factory.

Wells saws
Wells

Products by Wells are Practical
METAL CUTTING BAND SAWS
WELLS MANUFACTURING CORPORATION
1414 TAYLOR ST., THREE RIVERS, MICHIGAN

cial applications. Minimum height obtainable is 18 inches, regardless of the size of motor. The Rapids-Standard Co., Inc., Dept. P-132, 342 Rapistan Bldg., Grand Rapids 2, Mich.

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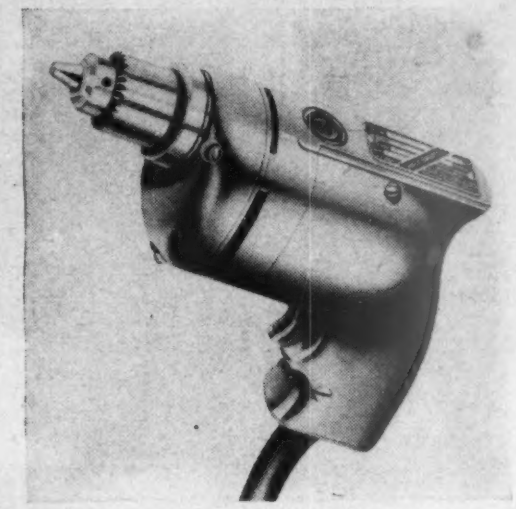


Electric Drill

Pistol-grip type electric drill is available in three different capacities and five different rated speeds (idle): ⅜-in. at 650 r.p.m.; 5/16-in. at 1000 r.p.m.; and ¼-in. at 2000, 3500, and 5000 r.p.m. Removable inspection plate permits access to motor brushes and commutator without dismantling drill. Both brushes are removable from the outside. Control switch is in the pistol grip and is of the heavy-duty two-pole type. Equipped with Jacobs chucks, and universal type motors for standard 115-volt current; weight, 3½ pounds. Milwaukee Electric Tool Corp., 5344 West State St., Milwaukee 8.

•

Motor-Generator Battery Charger

Portable automatic single-circuit motor-generator battery charger for motive power batteries, known as the "Charg-O-Matic", occupies less than 4 square feet of floor space. All electrical connections, relays, and other working parts, are mounted on a panel inside a metal cabinet, in which the horizontal motor-generator is housed, making the unit a "dead front" type. Control panel is set at an angle at desk-top level. A pilot indicates when the set is on charge. This unit replaces manufac-

"There's no substitute for the ZIP!"

THAT'S why I like to install these Zip-Lifts! They don't have to be replaced every few years. They do everything *right*—and don't give us trouble. No wonder, experienced users say— *"there's no substitute for a Zip!"*

The Zip-Lift is the small wire rope hoist with full magnetic push-button control. It's the standout in quality — with *added* values you'd expect only in the most expensive hoisting equipment. Benefit by proved experience — tens of thousands of P&H Zip-Lifts are now in service. Why not add one to your handling now — to boost production and cut costs? They're available for prompt delivery.

Get the facts on the P&H Zip-Lift today. Ask for Bulletin H20-4 — complete with applications, pictures, specifications, etc.

These are added values!

SAFER — Full magnetic control with control current reduced to 110 volts at the push-button. Plugging crane type limit switch and large double brakes provide maximum safety. No open wiring.

LIFETIME CONSTRUCTION — Precision built — shaved gears running in oil — grease-sealed anti-friction bearings—fully enclosed, moisture-proof, dust-proof, acid-proof.

SMOOTHER OPERATION — Motor specifically built for hoist service — high starting torque, frequent reversal, etc. Loads controlled within a fraction of an inch.

ALERT SERVICE — Out-of-stock delivery from qualified dealers everywhere—backed by 18 branch offices and 8 conveniently located warehouses.

The Zip-Lift is America's fastest selling wire rope hoist.

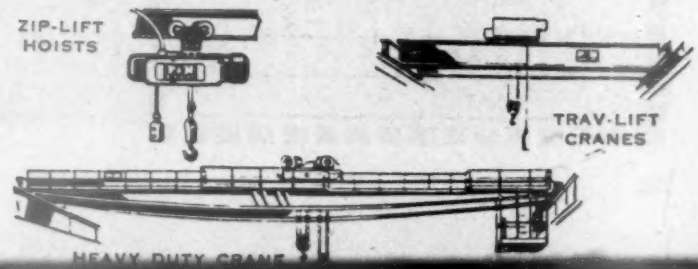
Handle it thru-the-air at lower cost

AVAILABLE IN CAPACITIES UP TO 2000 LBS.

P&H ELECTRIC HOISTS
4525 W. National Ave.
Milwaukee 14, Wis.

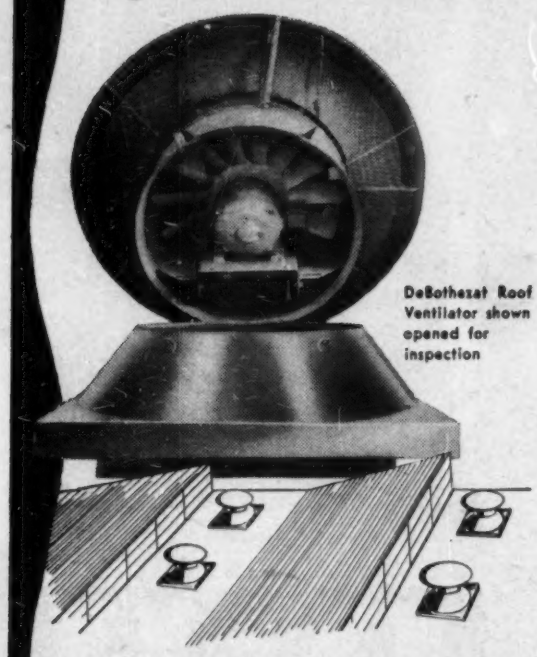
HARNISCHFEGER CORPORATION
HOISTS • WELDING ELECTRODES • MOTORS P&H EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

HEVI-LIFT HOISTS



CONTROLLED VENTILATION

Regardless of Weather

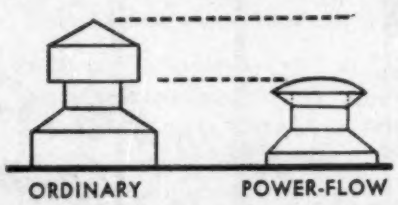


DeBothezat Roof Ventilator shown opened for inspection

EASY ACCESS FOR MAINTENANCE

The DeBothezat Power-Flow Roof Ventilator is a motor driven fan in a weatherproof housing. It provides positive, *controlled* ventilation independent of variable weather conditions. This is a decided improvement over gravity-type ventilators which are dependent upon wind velocities and temperature differences. Non-overload power characteristics of fan keeps power consumption practically constant and prevents motor burn-out. Hinged in two places, making all component parts easily accessible.

MODERN, STREAMLINED APPEARANCE



Low in height, Power-Flow Roof ventilators are designed for attractive appearance as well as efficient ventilation. Light-proof at night to meet any possible blackout regulations.

WRITE FOR COMPLETE INFORMATION

Wide range of sizes for all buildings. Fill in and mail coupon below and receive detailed information promptly.

DE BOTHEZAT FANS

- Bifurcator Fans
- Ventilating Sets
- Giant Fans
- Hy-V Air Jets

DEBOTHEZAT FANS DIVISION, DEPT. F,
AMERICAN MACHINE AND METALS, INC.,
EAST MOLINE, ILLINOIS.

Please send complete information on DeBothezat Power-Flow Roof Ventilators.

Name_____

Address_____

City & Zone_____

State_____

turer's Model H battery charger, and it is claimed that it will charge a lead-acid battery in 8 hours, a nickel-alkaline battery in 7 hours. The Hertner Electric Co., 12690 Elmwood Ave., Cleveland.

•

Floor Enamel

Made on a vinylite resin base, fast-drying, waterproof floor enamel is said to be impervious to greases, oils, brine, alcohols, petroleum, solvents, soaps, all alkalis, and most acids. It is resistant to corrosive fumes, and adheres to wood, concrete, and metal. It may be applied with brush or spray gun, and will not crack or peel off, according to manufacturer. Available in a complete range of colors. Benjamin Foster Co., 4635 West Girard Ave., Philadelphia 31.

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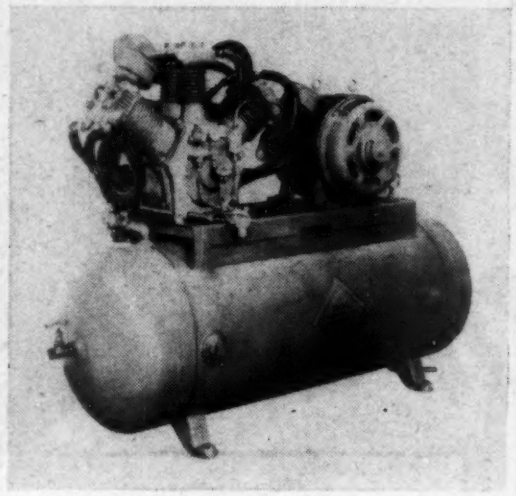

Air Compressor

One standardized set of 18 parts which make up a basic air compressor, called Air-Flo, is said to construct a line of 48 different models of 1-, 2-, 3-, 4-, or 6-cylinder pumps in single or 2-stage types. Manufacturer states that all parts are interchangeable from the smallest to the largest pump, which permits carrying a small basic inventory of replacement parts. Available in sizes from ½ to 40 horsepower, with 2.5 to 275 c.f.m. capacity at 30 to 300 pounds pressure in vertical, V-type, or side angle construction, with single, twin, or radial staggered cylinder arrangement. Air-Flo Compressor Co., Akron.

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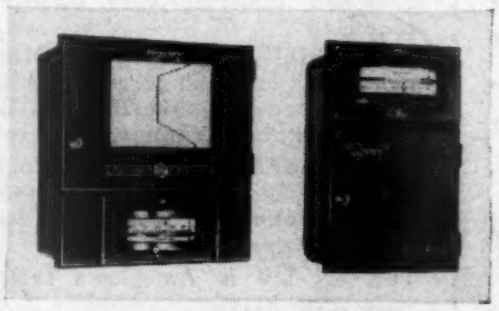
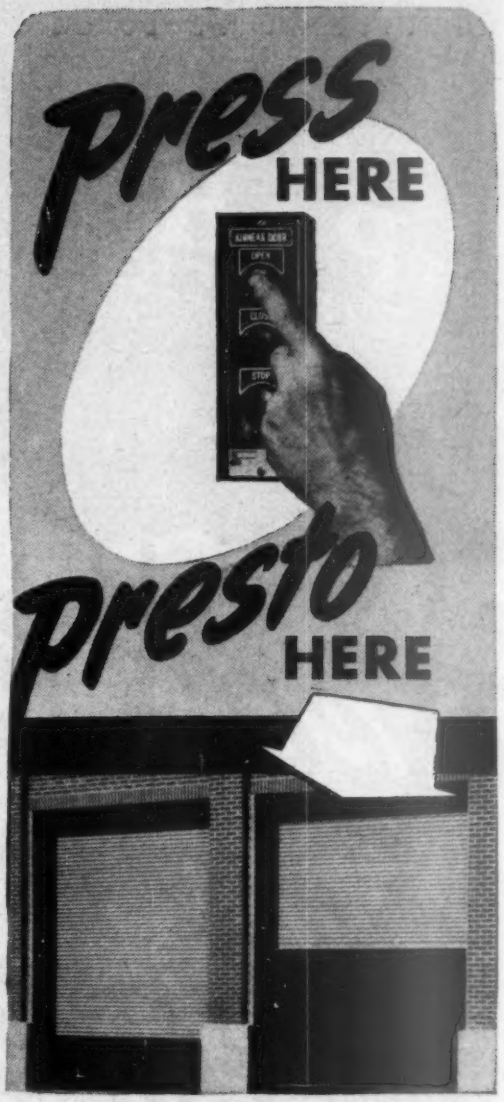


Temperature Control Instruments

Two types of instruments for indicating and recording temperature control, the Xactline-Capacitrol and the Xactline - Capacilog, combine conventional pyrometer control fea-



Motor-operated

KINNEAR DOORS

respond with magic ease to push-button control

It's sheer magic the way you can shave manpower losses and plug profit drains at doorways with Kinnear Steel Rolling Doors. A split-second and mere fingertip pressure are all the time and effort needed to start or stop these doors equipped with rugged Kinnear Motor Operators. Any number of push-button stations can be placed at strategic points —at door jamb for on-the-spot operation and elsewhere for step-saving remote control. And any number of doors can be operated from a single station.

The prompt, glide-smooth door action is possible because the Kinnear *interlocking-slat* steel curtain *lifts vertically* and coils compactly above the lintel. Openings remain completely clear. All surrounding floor and wall space is usable. This tough, flexible, all-metal door protector withstands years of weather attacks; resists fire and theft. For a better check-rein on profit leaks in plant operation, rely on efficient, economical Kinnear Steel Rolling Doors. Built any size, for installation in old or new buildings. Write for more facts today.

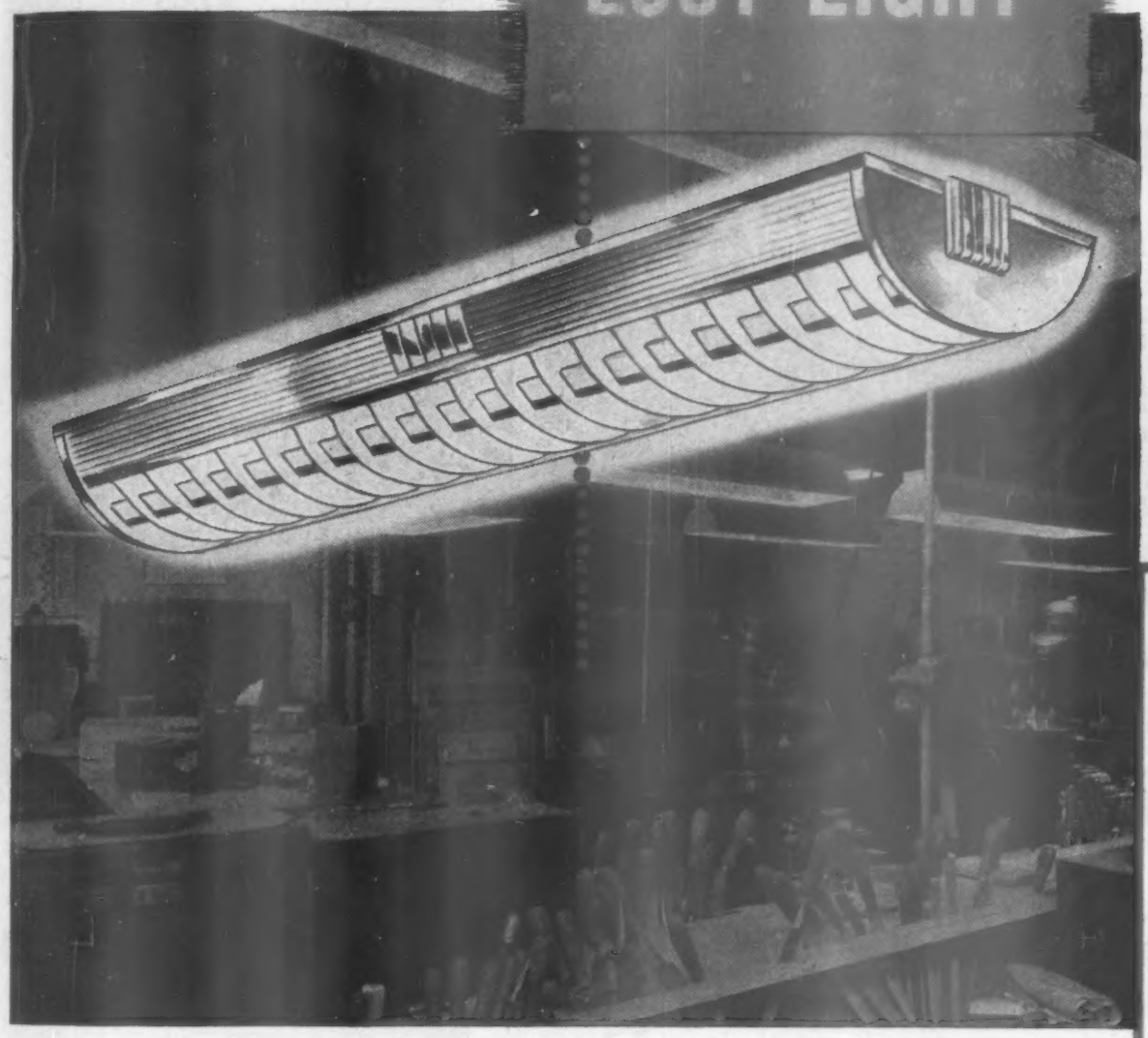
THE KINNEAR MANUFACTURING CO.

Factories: 1540-60 Fields Ave., Columbus 16, Ohio
1742 Yosemite Ave., San Francisco 24, California
Offices and Agents in All Principal Cities

Saving Ways in Doorways
KINNEAR
ROLLING DOORS

Brighter Reflector to

REDUCE "LOST LIGHT"



Improve the lighting conditions in shops and factories by installing high-efficiency Alzak*-processed Reflectors. The highly reflective aluminum surfaces are treated, then sealed with transparent oxide coatings to *keep* Alzak-processed Reflectors at high efficiency.

Maintenance and cleaning crews like the way Alzak-processed Reflectors can be quickly cleaned with soap and water to restore their high reflectivity. The all-aluminum reflector shells have no fragile coating to break or spall,if dented.

Leading lighting fixture manufacturers make Alzak-processed Reflectors in all standard styles and sizes.

ALUMINUM COMPANY OF AMERICA, 1941 Gulf Building, Pittsburgh 19, Pennsylvania. Sales offices in 55 leading cities.

*Patented process

Here's what THE ALZAK PROCESS DOES...

1. *Brightens* aluminum reflector surfaces electrochemically to produce lighting efficiencies as high as 83%.

2. *Seals* the bright, high-efficiency reflecting surface with a durable protective coating of transparent aluminum oxide.

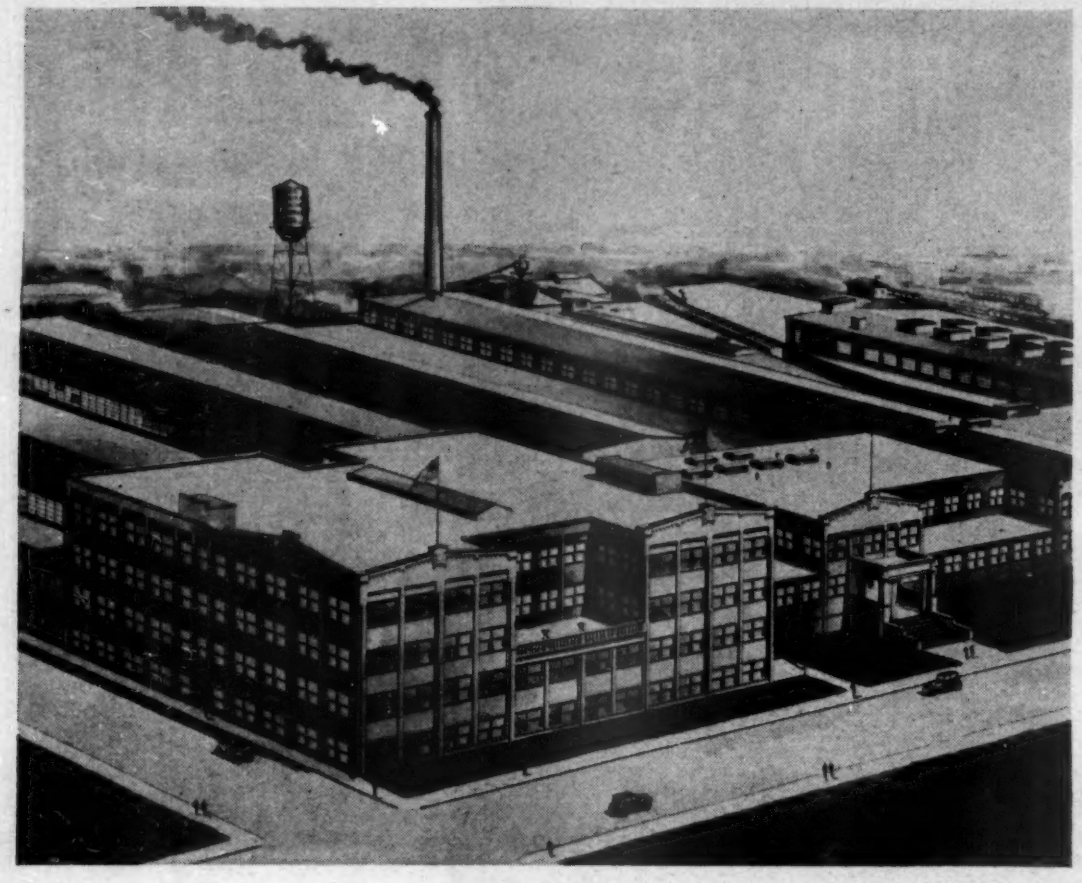
This Alzak surface treatment is an *integral* part of the aluminum reflector shell.

The Alzak Process is licensed by Alcoa only to manufacturers of carefully engineered lighting fixtures.

ALZAK® made and processed by leading lighting manufacturers

PROCESSED REFLECTORS OF ALCOA ALUMINUM

"KEX" Industrial Wiping TOWELS



American Laundry Machinery Company
Cincinnati, Ohio

Uses "KEX" Service

THE list of subscribers to "KEX" National Service reads like a volume of America's Industrial "Who's Who."

The low cost and efficiency offered by "KEX" Industrial Wiping Towels are behind this definite trend to "KEX" National Service. Managements like the idea of this automatic rental service that follows their wiping towel needs from week to week. The neat, easily handled bundles in which "KEX" are delivered help control distribution, and contribute to better housekeeping.

Follow the lead of industrial leaders all over the country who overlook no opportunity to keep costs down—and efficiency up.

Nothing to Buy—No Expensive Inventory—Just a Low Monthly Rental. The first month should show a decided saving on wiping costs.

For complete information, see your classified Telephone Directory for nearest KEX distributor, or write KEX NATIONAL SERVICE, 295 Fifth Avenue, New York 16, N. Y.

"KEX" NATIONAL SERVICE
REG. U.S. PAT. OFF.

tures with auxiliary devices for maintaining precision straight-line temperature control. They are both applicable to any electrically heated or fuel-fired oven or furnace equipped with motor-operated or solenoid valve. Precision temperature control is said to be automatic regardless of the size of the furnace, the size of the load, or the length of the heating cycle. With either instrument, the only adjustment necessary is the selection of the desired temperature control point. Claude S. Gordon Co., 3000 South Wallace St., Chicago 16.

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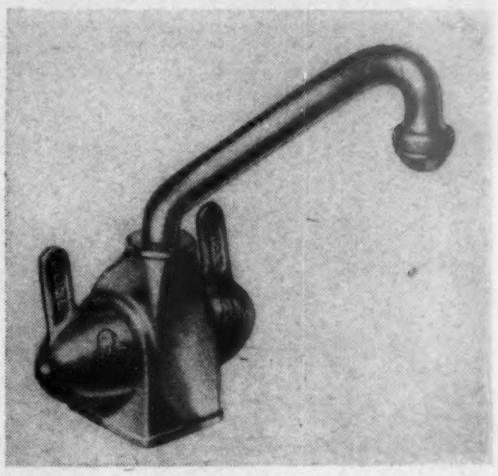

Water Faucet

Instead of having one faucet to control the hot water and another the cold, faucet has one handle that regulates and maintains the temperature of the water within two degrees of any desired heat. A second handle controls the volume. Faucet is provided with an anti-splash feature and is supplied in swing spout, lavatory, and institutional models. Cole Valve Co., c/o Mueller Brass Co., Port Huron, Mich.

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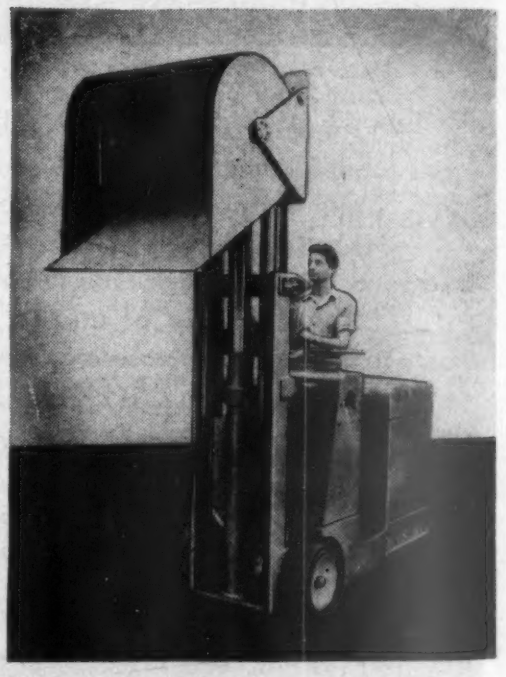
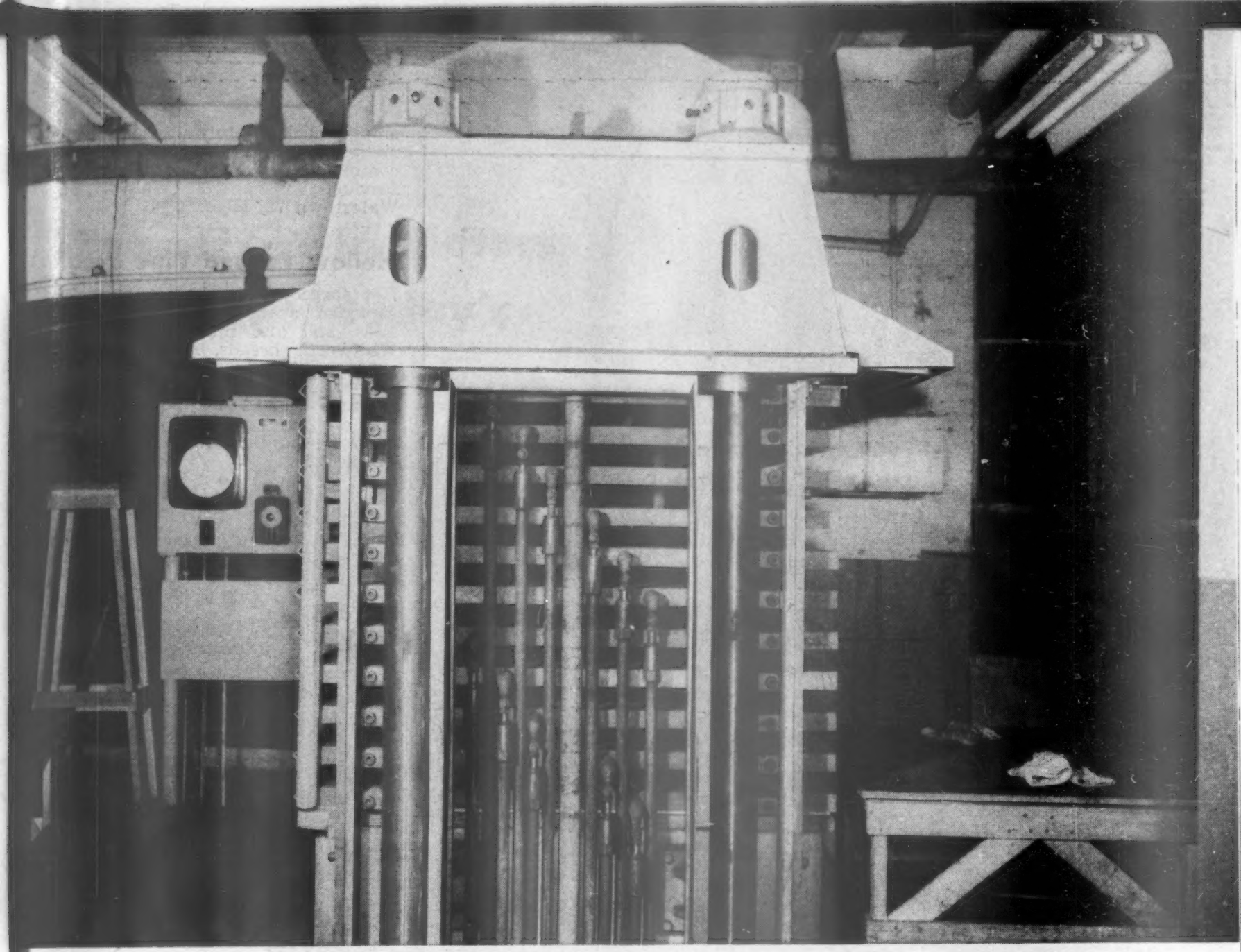


Dump Bucket Scoop Attachment

A dump bucket attachment for manufacturer's L-S "Standrive" power fork trucks is designed for loading and unloading railroad cars and trucks, for movement of loose and hard-to-manage materials. Load is dumped by releasing latch. When



Solves heat-and-water problem...

Lubrication of the telescopic steam joints on a hot-plate veneer press was a continual problem for a midwest furniture manufacturer. The job required a grease that would withstand temperatures of 240° to 260°F. and the severe washing action of steam and water.

Conventional greases failed to meet these requirements. Joints had to be lubricated frequently. This interfered with production and resulted in excessive consumption of the lubricant.

A Standard Oil Lubrication Engineer suggested that Stanolith Grease No. 57 be used. This is a lithium soap product capable of standing up under high temperatures and of resisting the washing action of water. Since the switch to "Stanolith," the joints have been lubricated between shifts with no interruption of production. Lubricant consumption has been reduced 40%.

Stanolith Grease No. 57

Where the combination of heat and water causes lubrication difficulties, try Stanolith Grease. A Standard Oil Lubrication Engineer will be glad to give you more data on this versatile product. If your plant is located in the Midwest, write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, to secure the services of the engineer nearest you.

STANDARD OIL COMPANY (INDIANA)

STANDARD

FEDRABEL

VIBRATING AND SINGLE STROKE
HEAVY DUTY • UNDERDOME TYPE

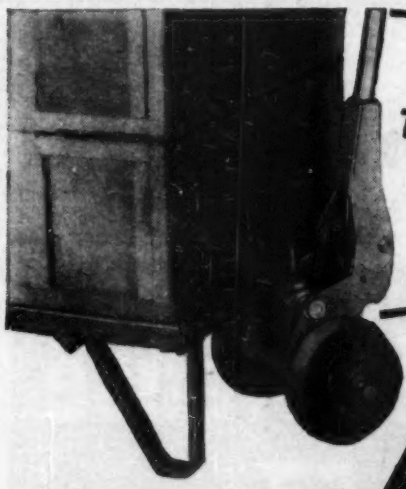
The Fedrabel produces a powerful penetrating tone providing improved signal density.

The Fedrabel will operate in any position. Especially adapted for interior, it has a "plug-in" feature available at no extra cost. The "plug-in" bell fits any standard outlet box, minimizing installation difficulty.

Bell mechanism is enclosed in standard weatherproof housing. Mounted with the plunger *down* condensation is automatically drained from mechanism—insuring longer life.

Models available to suit your current supply—write for Bulletin 103.

FEDERAL ENTERPRISES, INC.
formerly **FEDERAL ELECTRIC CO., INC.**
8716 South State Street • Chicago 19, Illinois



THE ONLY MECHANICAL JACK WITH NO SPRINGS

Nutting JACK AND LIVE SKIDS
FOR FLEXIBLE LOW COST MATERIALS HANDLING

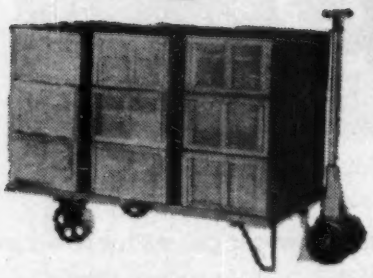


FIG. 421. Standard Industrial Skid, 9 platform sizes from 24" x 48" to 42" x 72". Capacity 1800 lbs. Metal or Rubber Tired Wheels.

FIG. 420. Heavy Duty Industrial Skid, 9 platform sizes as above. Welded angle steel frame. Capacity 2800 lbs. Metal or Rubber Tired Wheels.

Only the Nutting Jack is operated by gravity and leverage—no springs to break!—no danger of your jack-skid system suddenly bogging down. The Nutting Jack is unique in its simple, rugged construction, and has many other advantages: complete control of load at all times, easy swiveling under full load, extreme range of tongue positions for short turns, extra high lift for steep ramps or high thresholds without striking skid legs.

Nutting Live Skids are sturdily built to Nutting standards of quality. They take the grief year after year. A large range of standard platform sizes, with superstructures available if desired. The Nutting Jack-Skid System is outstanding—investigate!—compare!

Nutting Makes Everything in FLOOR TRUCKS, WHEELS, CASTERS.

Look in your classified phone directory for your nearest Nutting representative, or write for Bulletin 48-G direct to

our 57th Year **NUTTING TRUCK and CASTER COMPANY**

1415 DIVISION ST. FARIBAULT, MINNESOTA

empty, bucket returns to locked upright position only after being completely lowered. Lewis-Shepard Products, Inc., 273 Walnut St., Watertown 72, Mass.

•

Hollow Forged Pipe Plug

Hot forged pipe plug is precision threaded to American Standard pipe sizes, and also made with British Whitworth threads. Available in ¾- and 1-in. sizes, square head black or galvanized. Designed for cold working pressures of 3000 pounds water, oil, or gas; non-shock. Pittsburgh Pipe & Coupling Company, Allison Park, Pa.

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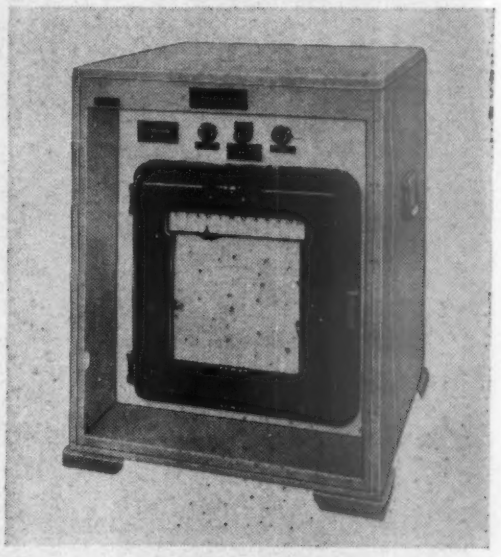

Portable Electric Pyrometer

Portable electric pyrometer recorder and controller, which can record or control heat at six locations to 2200 deg. F., is arranged for *off-on* control. Suitable for the control of temperature of heating processes and set-up, and for experimental operations; may be used for semi-automatic program control, for heat cycles, or for completely automatic cycle program control. In the welding field, it can be used with induction heaters for preheating before and stress relieving after welding. It may also be utilized with resistance heating equipment. Electric-Arc, Inc., 152-162 Jelliff Ave., Newark 8, N. J.

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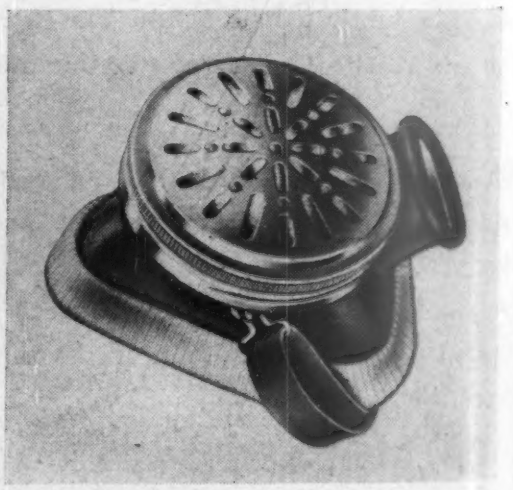
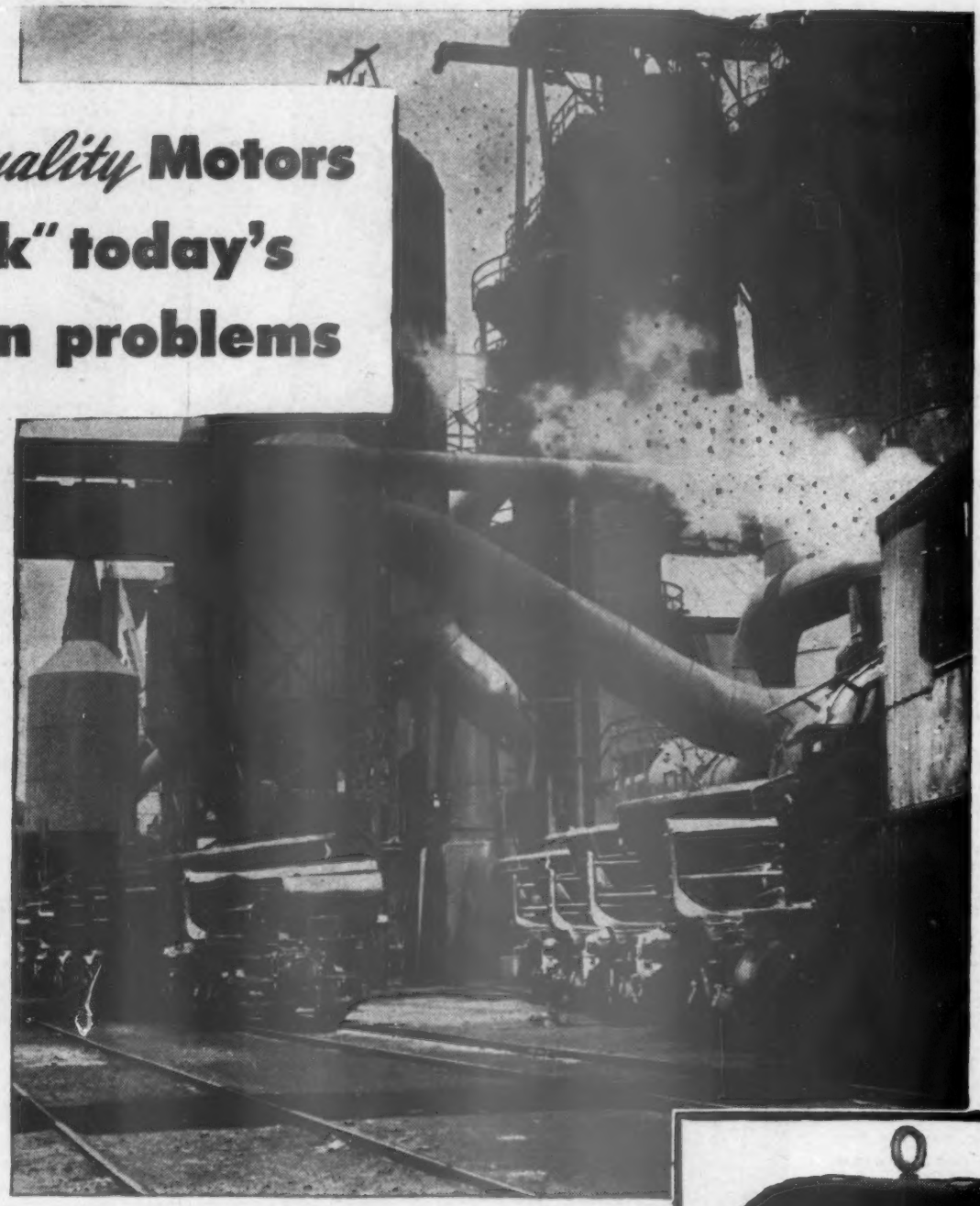


Respirator

Designed to protect against light concentrations of dusts, respirator,

Wagner *Quality* Motors help "lick" today's production problems



In order to combat rapidly rising production costs, industry is placing greater emphasis on high-speed, economical production techniques. Down time is lost time—motor failures can prove more costly than ever before . . .

Wagner Quality Motors are famous for their dependability. They have the stamina to stand up under severe operating conditions—to stay on the job without frequent breakdowns—because they are made of highest quality materials and are engineered to do their job efficiently.

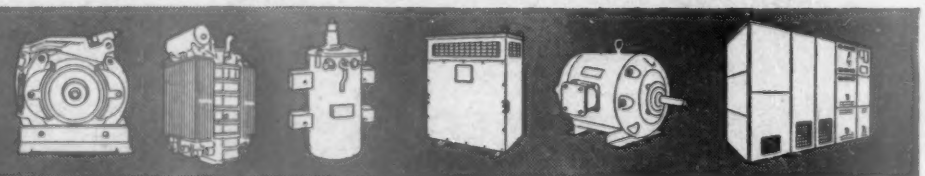
If you need motors that can help "lick" *your* production problems, whether large or small, consult the nearest of our twenty-nine branches. They are located in principal cities and are manned by experienced field engineers who will help you solve your motor application problems. Quick, convenient service facilities are available for users of Wagner Motors. Write for Bulletin MU-185 for information on the complete line of Wagner Quality Motors.

Wagner protected motor, tested and approved by Underwriters' Laboratories for Class 1 Group D and Class 2 Group G hazardous locations.

Wagner Electric Corporation
6412 PLYMOUTH AVE., ST. LOUIS 14, MO., U. S. A.

Consult Wagner Engineers on all Electric Motor Problems

Wagner Electric Corporation EST. WE 1891



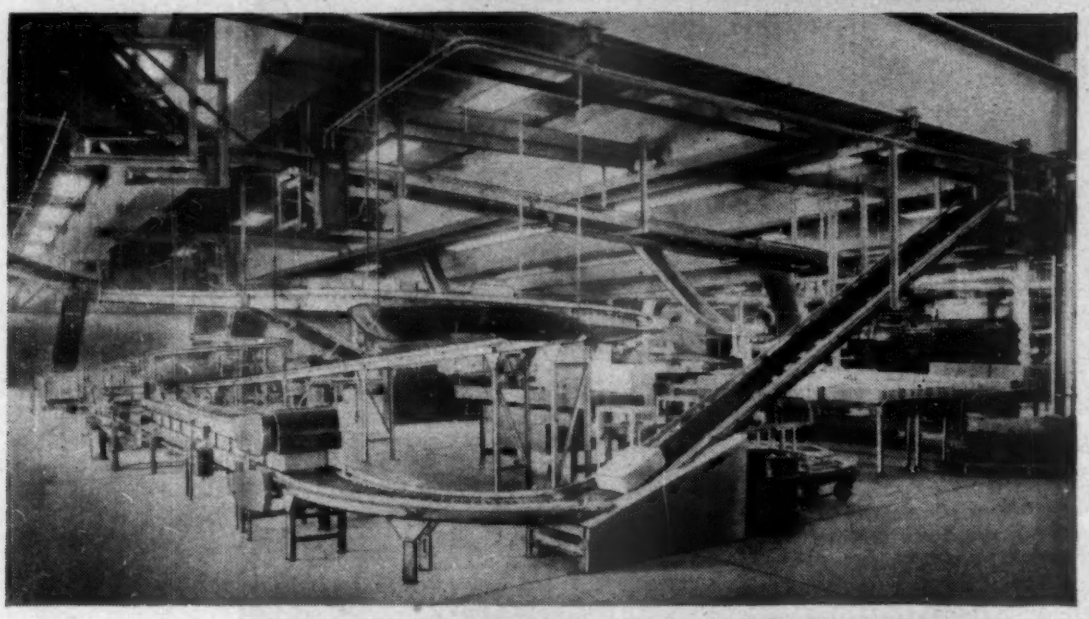
BRIDGE BRAKES • POWER AND DISTRIBUTION TRANSFORMERS • MOTORS • UNIT SUBSTATIONS

ELECTRICAL AND AUTOMOTIVE PRODUCTS

M48-12

A-F GRAVITY ROLLER
A-F LIVE ROLLER
A-F BELT CONVEYORS
A-F PORTABLES

ALL CONVEYING SYSTEMS LEAD TO GREATER EFFICIENCY!



The finished products of this leading manufacturer of electrical products flow in an endless stream from the production department on upper floors — down and around — through the shipping department on the A-F Engineered Completely Co-ordinated Conveying System shown above.

WHY BE SATISFIED WITH LESS?

Throughout the giant, new plant of this midwestern manufacturer, an Alvey-Ferguson Completely Co-ordinated Conveying System moves raw materials into the plant—through all stages of production and to the shipping dock . . . quickly, efficiently, economically. Production flow in your plant—as in this one, can be smooth and constant with idle time eliminated. And, because all lifting operations are eliminated, employee fatigue is greatly reduced—production greatly increased!

Why be satisfied with less? Write without obligation for a discussion of your products handling methods or for a folder showing how A-F Engineers have solved other materials-handling and products-handling problems—today!

THE ALVEY-FERGUSON COMPANY

142 DISNEY ST. *Established 1901* CINCINNATI 9, OHIO

Offices or Representatives in Principal Cities—Coast to Coast

CONVEYING EQUIPMENT
Alvey-Ferguson
METAL PRODUCTS CLEANING EQUIPMENT

R-2900, allows unobstructed front and side vision. Filter is lightweight and replaceable. Retainer cup is light and durable. The molded rubber face mask fits faces comfortably, according to manufacturer, who states that the inhalation and exhalation valves prevent dust infiltration while allowing easy breathing. American Optical Co., Southbridge, Mass.

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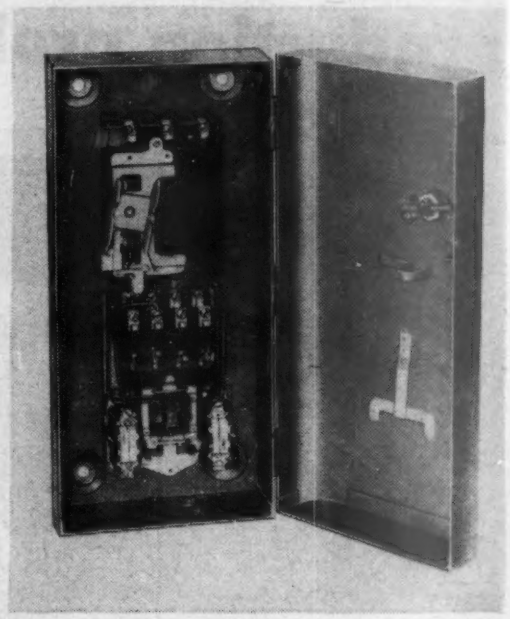

Magnetic Starters

Line of a.c. combination magnetic starters with circuit breakers, called Bulletin 4130, meet Code requirement for motor branch circuit overcurrent protection, disconnect, motor overcurrent protection, and controller. Each starter consists of a magnetically operated contactor with thermal inverse time delay overload relays combined with a thermal type circuit breaker, housed in NEMA Type I enclosure. Externally operated from the front, all circuit breakers have provision for padlocking in the *off* position, and are interlocked mechanically to prevent opening enclosure door when breaker is *on*. Available in five standard sizes to 200 horsepower, three-phase, 550 volts, 60 cycles maximum. Can be supplied with reset button only in cover, and with local control pushbuttons or selector switches. Ward-Leonard Electric Co., Mt. Vernon, N. Y.

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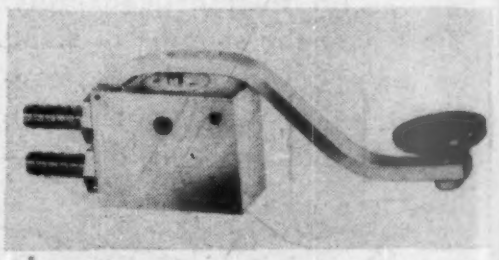


Air Valve

Two models of a poppet-type, three-way air valve, called FT-101 and FC-101, have 5/16-in. minimum openings throughout. The increased apertures and large air cylinder make them quick acting, according to manufacturer, who states that they retain the light touch and instant response of the smaller valves. They

get SKILSaw !

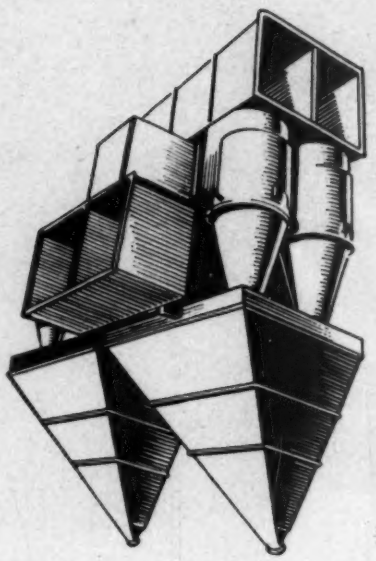
ELECTRIC
Tools
PNEUMATIC

PRACTICAL

dust

RECOVERY

can be a reality



. . . if you logically consider the problem. Too few dollars can easily buy disappointing efficiency while it is just as possible to over-invest with the same result. That's where the Buell van Tongeren Cyclone comes in. With a patented "Shave-Off" to overcome the "double eddy" evil, it can be big enough to overcome plugging hazards. Individually engineered for each specific application Buell is in a class apart in achieving high fractional efficiencies. There's convincing data in the 1948 Buell catalog. Write to: Buell Engineering Company, 12 Cedar Street, New York 5, N. Y.

buell

Engineered Efficiency in DUST RECOVERY

are fitted with nipples to take ⅜-in. I.D. and up to ¾-in. O.D. hose. Mounting holes at top and sides of the rectangular valve body make it possible to attach them to any machine for either cam or fingertip operation. Available in normally closed *off* type. Mead Specialties Co., Dept. ST-1, 4114 North Knox Ave., Chicago 41.

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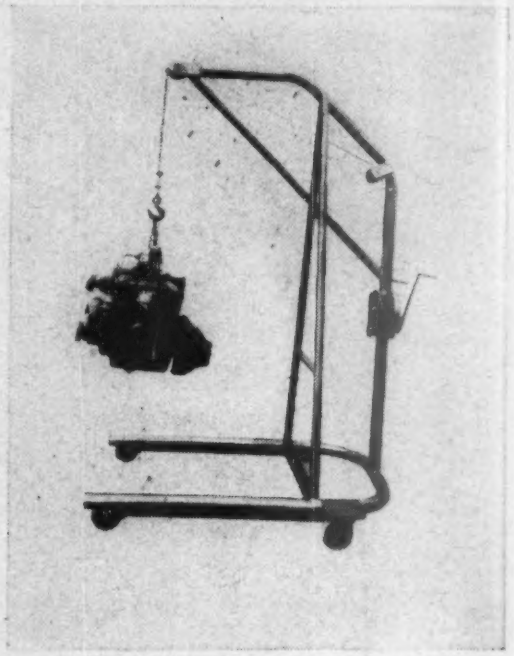

Portable Shop Cranes

Three portable shop cranes are suitable for handling motors, engines, castings, and similar items in and out of lathes and other machine tools, dies in and out of punch presses, loading and unloading trucks, and moving other heavy parts. No. 1-C, with a lift up to 7 feet, and No. 2-C, with a lift up to 8½ feet, have a capacity of 3000 pounds. No. 7-C, with a maximum lift of 10 feet 8 inches, has a capacity of 4000 to 7000 pounds. No. 1-C weighs 350 pounds; No. 2-C, 365 pounds; and No. 7-C, 480 pounds, all light enough to be wheeled anywhere. On Model 7-C, boom can be extended to 79 inches. When folded down it is only 48 inches from the ground. No. 7-C may be supplied with hydraulic operation with extra reach and lift capacities. Grand Specialties Co., 3135 West Grand Ave., Chicago 22.

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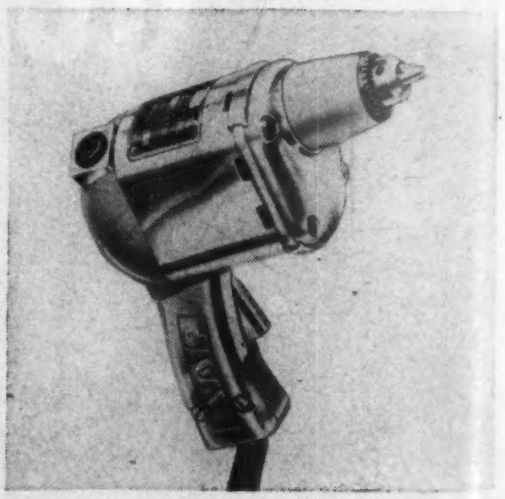
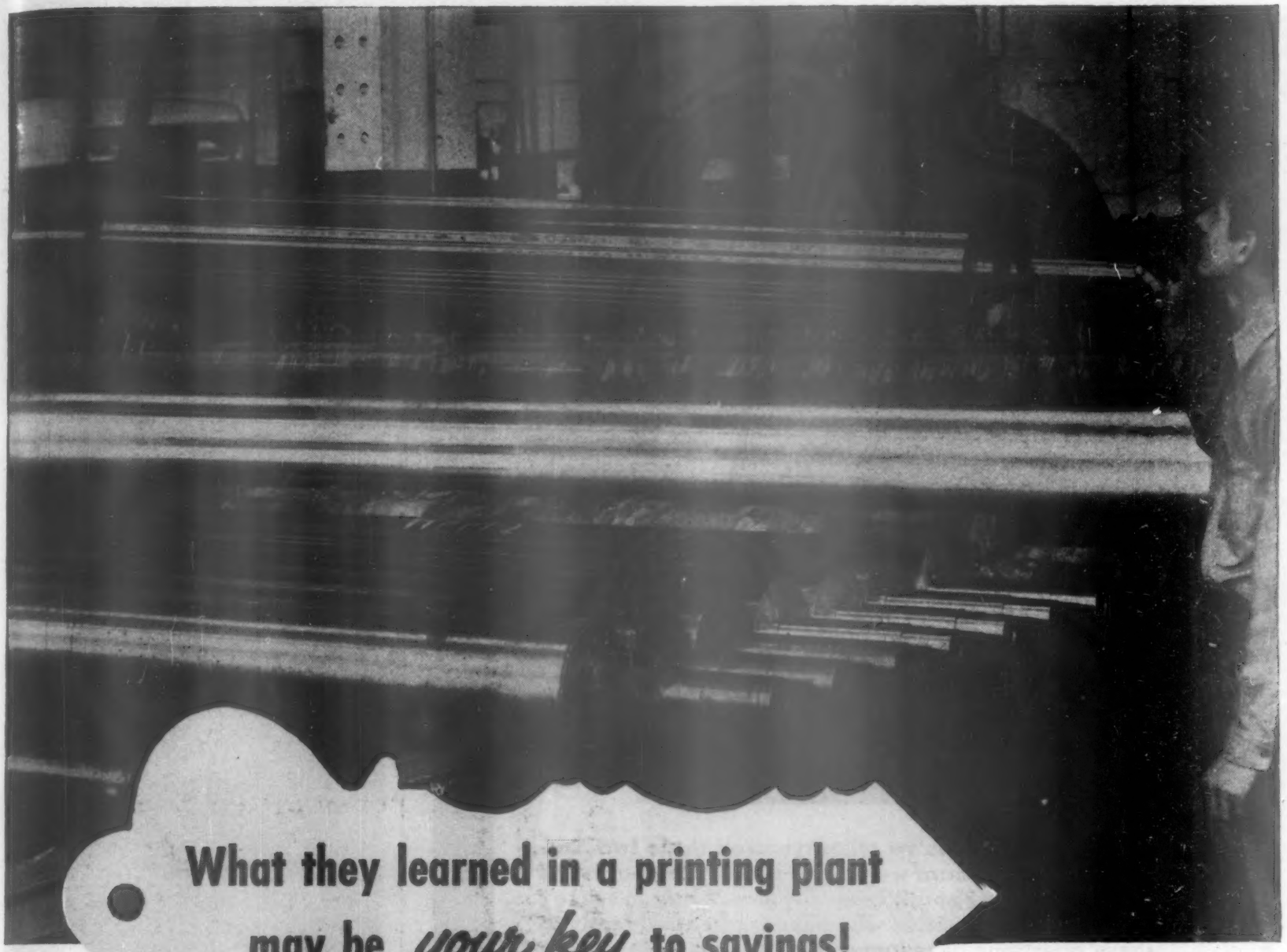


Electric Drill

Lightweight ball-bearing ¼-in. electric drill, designated Type EG-2C,



What they learned in a printing plant may be *your key* to savings!

SHOWN above is a bronze printing press roll. It is one of hundreds cast by the Shenango-Penn *centrifugal* process and then completely finished to specification in the modern Shenango-Penn shops.

Printing plants supplied with these rolls find them to be superior to ordinary rolls. The printers save time and money. The press manufacturers or equipment suppliers save plenty, too! Here's why . . .

The Shenango-Penn centrifugal process provides stronger, pressure-dense castings with finer-than-usual grain. So the rolls readily take an ideal mirror finish, last longer, are better able to resist breakage or distortion. Trouble is avoided. Maintenance and service time is reduced. Moreover, metal is saved. So is finishing time, because there's less machining to do! And finally, imperfections such as sand inclusions and blow holes simply don't exist! There are fewer wasteful rejects. The finished rolls do a better job! Longer!

However, Shenango-Penn experience and facilities aren't by any means limited to bronze rolls. Here, virtually *any* symmetrical part, tiny or huge, ferrous or nonferrous, can be cast centrifugally and furnished rough, semi- or finish-machined, as you wish—bushings, bearings, sleeves, liners, collars, rings, etc. If you use or need such parts, we believe we can show you some really worthwhile savings and advantages. Why not let us *prove* it?

SHENANGO-PENN MOLD COMPANY

2872 West Third St. **Dover, Ohio**

Executive Offices: Pittsburgh, Pa.

FREE BULLETINS

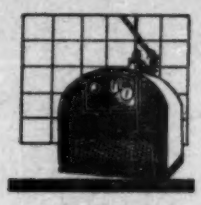
No. 143—Centrifugal castings of non-ferrous metals and alloys.

No. 144—Centrifugal and static castings of plain and alloyed irons.

No. 145—Centrifugally cast bushing stock in all standard sizes.

SHENANGO-PENN

ALL BRONZES • MONEL METAL • ALLOY IRONS



FIXED SYSTEMS
500 pounds to 125 tons of Cardox CO_2, stored in one centrally located Storage Unit. Automatic protection for single or multiple hazards.

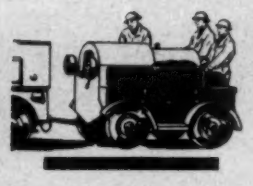
FIRE TRUCK
Tons of CO_2 on wheels. May be used with fixed standpipe systems.

TRANSITANK*
Mobile plant protection by means of 750 pounds of Cardox CO_2.

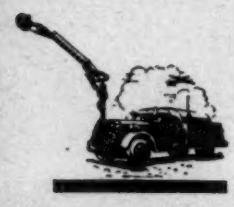
ENGINEERED FOR FAST, NON-DAMAGING

Extinguishment

OF TOUGH FIRES



FIRE TRAILER*
Especially designed for outdoor use. Carries both Cardox CO_2 and foam.



AIRPORT FIRE TRUCK
Stops vicious airport crash fires in seconds. World's most effective airport fire protection.

How long since you've asked yourself these two $64 questions: *How hard would one bad fire hit our plant and production?* and *Where is it most likely to strike?* Hundreds of industries who have faced up squarely to these questions have found that the only *safe* answer is *complete* protection for *key* hazards—and that that protection can best be supplied by Cardox and *low-pressure* carbon dioxide.

For Cardox protects *three* ways. (1) By its amazingly quick extinguishment, Cardox CO_2 eliminates or reduces fire damage. (2) It causes *no* extinguishment damage whatsoever. (3) It can be applied with equal facility in pounds or tons. When it's Cardox you *know* there's enough of the extinguishing medium to do the job, for that is basic to the Cardox method, engineering and recommendations.

Get the facts on what Cardox protection means for *your* particular hazards. Write today for FREE survey and counsel or Bulletin No. 1128.

CARDOX OFFERS ALL THREE

EXTINGUISHMENT
Cardox engineered applications give carbon dioxide enhanced effectiveness for faster, surer extinguishment of large or small fires, indoors or out.

PREVENTION
Cardox Atmosphere Inerting Systems provide low-cost inert gas for continuous fire and explosion protection.

DETECTION
Cardox Detection Systems, actuated by heat, smoke or flame, operate as a warning device or to actuate fire extinguishing systems.

*Available in Many Parts of the Country

CARDOX
CO_2 FIRE EXTINGUISHING SYSTEMS

CARDOX CORPORATION • 307 N. Michigan Avenue, Chicago 1, Illinois

District Offices: New York • Philadelphia • Pittsburgh • Cleveland • Detroit • St. Louis • Los Angeles San Diego • San Francisco

is adapted to drilling in confined quarters, according to manufacturer, who states that it is also suitable for operation in a bench drill stand, or as a bench grinder. Drilling capacity in steel is ¼ inch; in wood, ⅜ inch. Net weight is 4⅜ pounds. Full load speed is 1400 r.p.m. Fred L. Stuart, 330 West 42nd St., New York 18.

•

Floor Patch

For repair of concrete floors, substance known as Tampatch may be applied to broken, rough, or uneven concrete surfaces, interior or exterior. Maker states that the floor may be placed in service almost immediately after repairs have been made, and that traffic over the area smooths out the repaired section by a compressing action. The material is available in ready-mix form. United Laboratories, Inc., 16801 Euclid Ave., Cleveland 12.

•

Scaffold

Designed for use by painters and maintenance men, suspended scaffold, called Gold Medal Midget Safety Swinging Scaffold, may be suspended from *S* or *L* hooks by 75 feet of ¼-in. plow steel wire rope. Scaffold is raised and lowered by a small machine which, according to the manufacturer, is light enough to be carried by one man. Three steel locking pawls, the worm and gear lowering mechanism, and a safety crank handle keep the scaffold locked at all times, and are said to prevent slipping or running down. The Patent Scaffolding Co., Inc., 38-21 12th St., Long Island City 1, N. Y.

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Atmosphere Indicator

Developed to indicate the relative oxidizing or reducing action of the atmosphere within a furnace, metal heat-treating oven, or similar equipment, atmosphere indicator utilizes the combined physical properties of the mixed gases occurring in the combustion of fuel so that an empirical indication is obtained free from ambiguous indications, according to manufacturer. This instrument continuously analyzes gases given off in such a way that a record of the furnace condition during an entire run is furnished automatically on an electrical indicator. Each gaseous component of combustion contributes to the final reading approxi-

mately proportionate to its relative oxidizing or reducing effect. Once installed, no adjustments are necessary. Normal furnace controls are operated in the usual manner. When results reach their most ideal state, the reading of the indicator then establishes the correct operating point at which subsequent heats can be duplicated. Indicator scale is graduated for 0 to 25; the instrument operates on a 115-volt, 60-cycle power source, draws less than 100 watts, and has only one moving part. Charles Engelhard, Inc., 850 Passaic Ave., East Newark, N. J.

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Heavy-Duty Mobile Crane

For use in lifting and transporting heavy loads, rubber-tired, two-engined mobile crane, called the Lorain M. C. 820 Moto-Train, is said to have a safe-rated lifting capacity, on outriggers, of 45 tons at a 12-ft. radius. It weighs 65 tons; its length, with boom in travel position over front of carrier, is 66 feet, 5 inches; width, from outside to outside of tires, 11 feet, 7¾ inches; height, with gantry erected, 19 feet, 5 inches; with gantry lowered, 14 feet. Outriggers are of the telescopic type, one amidships and one across the rear of the carrier frame. One reverse and five forward speeds range from 1¾ to 18 m.p.h. All wheels are dual, with 18-ply Rock Grip excavator tires. Rear wheels are equipped with service air brakes; a parking brake also is provided. Thew Shovel Co., 1410 Terminal Tower, Cleveland 13.

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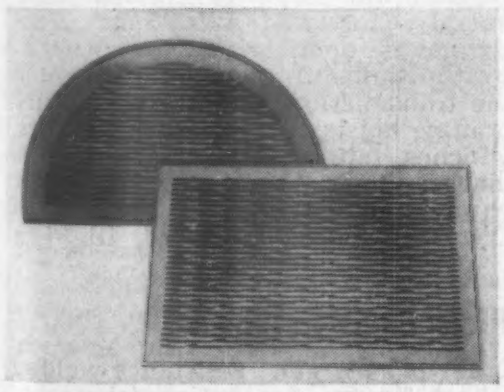


Floor Mat

Two general utility mats, called Guard-A-Mats, are intended to protect flooring and provide relief from long hours of standing in the same place. Mats are made of ribbed rubber with a self-cleaning squeegee

EC&M PLATE-MAGNETS *do it better*
save up to 90% in handling time

Handling steel by a magnet is the fastest method known. Place the magnet on the work, turn on the power and steel is transported without delay. No time lost in affixing chains—no danger of pinching hands—the crane operator often works without a ground-man.

This plant uses several EC&M Plate-Magnets for loading, unloading, stacking and carrying steel to shears and other processing equipment. Picking up stubs around the shears keeps floor clean.

EC&M Plate-Magnets are built in several sizes for every handling need. Send us the facts of your operations so that we may write fully when sending Bulletin 903 describing EC&M Plate-Magnets.

Burned Plates, too, pull out easily when lifted by Magnet.

TELL ALL FOR PROMPT RECOMMENDATION

Give an idea of your plant layout and equipment, and material handled, such as —

1 - Style and capacity of crane.
2 - Voltage available (direct current is required for magnets).
3 Overall dimensions and weight of material handled.

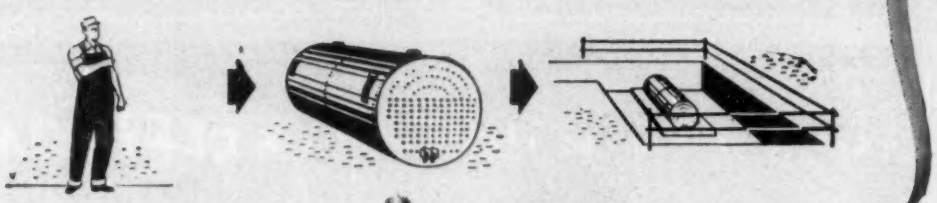
THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79TH STREET • CLEVELAND 4, OHIO

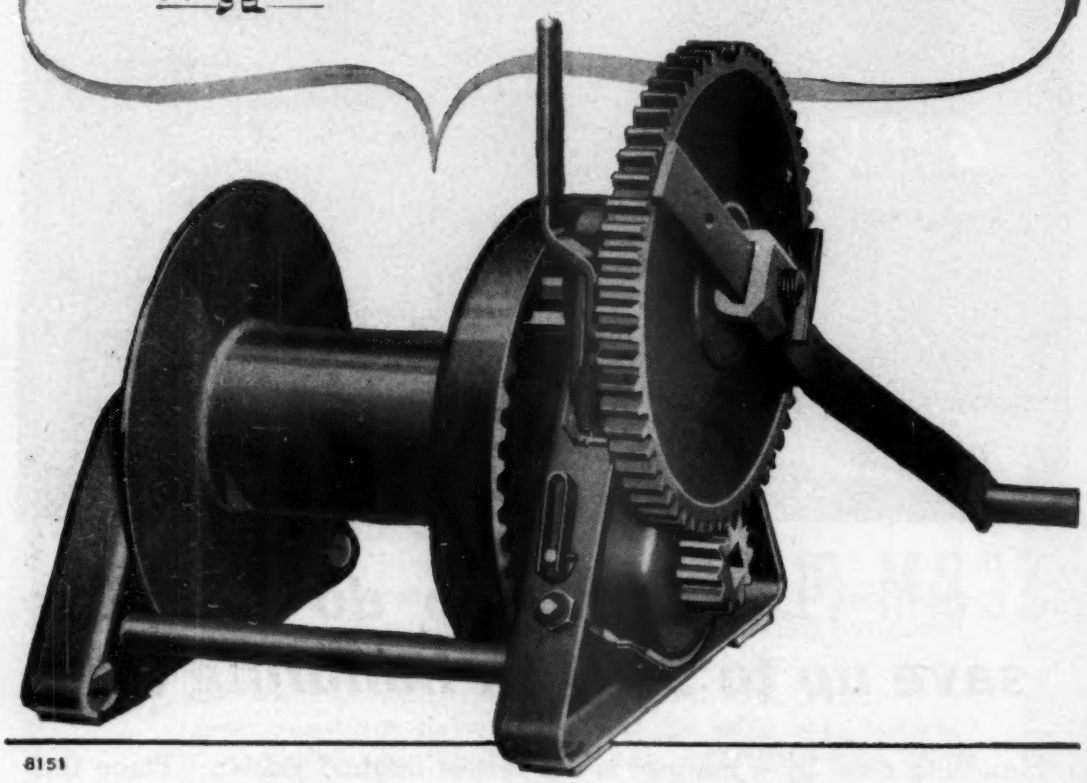
Would you believe . . .

that one man, with no power equipment . . .

can haul this heavy boiler . . .,

out of this deep pit?





8151

The job's a cinch . . . with

HANDIWINCH

● It's easy as **ABC** . . . here's how he'd do it . . .

(A) Carries HANDIWINCH to the job. (B) Sets it up on any firm support. (C) Anchors it. (D) Using planks for a ramp, he fastens rope to boiler and hauls it up and out.

Stoutest, most ingenious small winch ever built, HANDIWINCH and *one man* can handle any lifting or pulling job up to 10,000 lbs. All steel construction . . . cut gears . . . two power ratios . . . powerful hand brake . . . many "big hoist" features.

Ask your distributor . . . or write direct for folder HW-15, showing many typical HANDIWINCH set-ups.

American Hoist
and DERRICK COMPANY
St. Paul 1, Minnesota

Plant No. 2:
So. Kearny, N.J.

Sales Offices:
CHICAGO • PITTSBURGH • SAN FRANCISCO • NEW ORLEANS • NEW YORK

For Armored Construction . . . specify
AMERICAN BLOCKS AND SHEAVES
A wide line of wire rope blocks—many types, all sizes, in capacities from 1½ to 250 tons. Thick steel side plates, heavy pins and axles. Ask for American equipment when ordering.

For fastening wire rope, use genuine
CROSBY CLIPS

Hot dip galvanized—high wings—grooved saddle—precision cut threads. To make sure you get genuine CROSBY CLIPS, look for the famous Red U-Bolt. All sizes—⅛ to 3 inches. Distributors everywhere.

non-slip tread. Two types are available: General utility mat which measures 13½x21½ inches, and the semi-round mat which measures 18x30 inches. Back of the mat has suction chambers to keep it in place. The squeegee treads are said to hold dirt until the mat is ready to be cleaned. To clean, flex the mat to loosen and remove the dirt, and sweep. Maker states that the treads of the mat are so arranged that one stroke of the broom cleans the entire length of the mat. Dallas Mfg. & Sales Co., Inc., Box 7181, Dallas 9, Tex.

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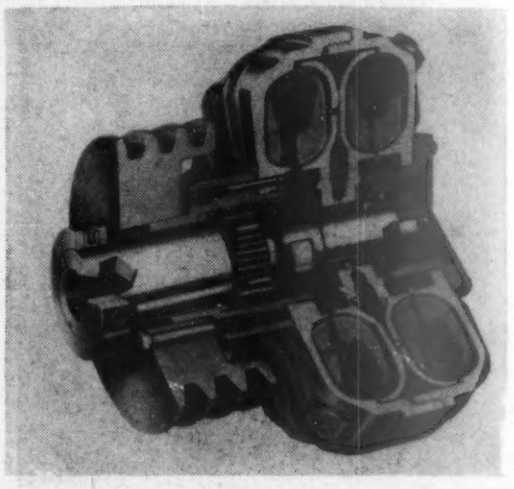

Hydraulic Power Transmission Unit

Hydraulic conversion device for small electric motors and internal combustion engines, called the Hydro-Sheave Drive, is designed for use with Worthington QD V-belt sheaves. It features a small hydraulic coupling, to smother shock and smooth the flow of power from motors or engines in a ¾- to 25-hp. range. Oil is used as the medium of power transmission. Incoming power from the electric motor or internal combustion engine rotates the hydraulic coupling inner member, the blades of which throw a continuous stream of oil against the vanes of the coupling outer member, or housing. The rotation of the housing with its attached sheave or sprocket provides flow of power. Manufacturer claims that any sudden shock, or overload, from the driven equipment is absorbed by the fluid in the hydraulic coupling so that it never reaches the motor or engine. Conversely, torsional vibrations from the engine or motor are damped out by the fluid. Applications to which the transmission unit is suitable are cranes, hoists, conveyors, elevators, winches, fans, blowers, compressors, machine tools, test stands, and other equipment. Hydraulic Div., Twin Disc Clutch Co., Rockford, Ill.

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Fire Extinguishers

Line of 2½-gal. resistance-welded silicon bronze fire extinguishers replaces manufacturer's riveted and copper fabricated units of the same capacity. Extinguishers are available in soda-acid, foam, plain water, and anti-freeze water types. Features include resistance welded seams; welded hemispherical domes,

Another Thermoid *First!*

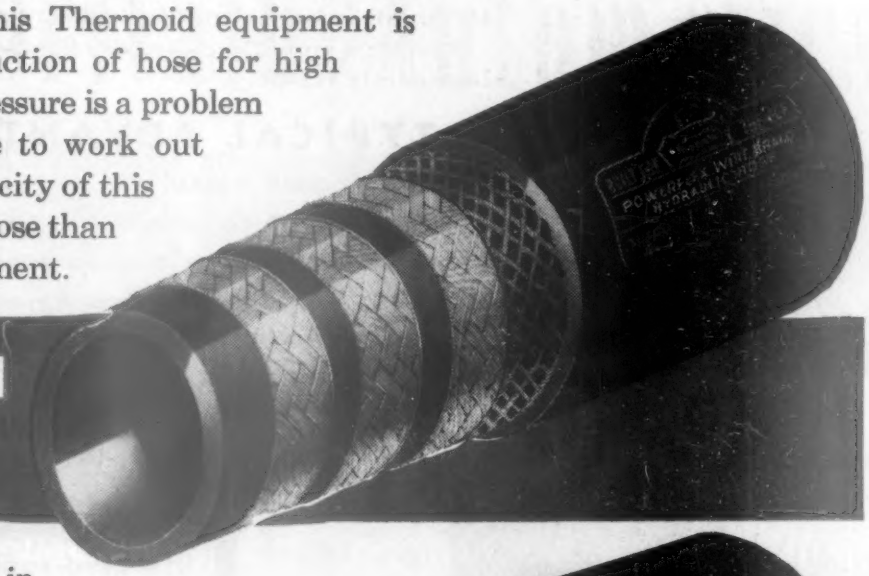
New Wire Braiding Equipment Produces Larger, Stronger Hose for High Pressures

The world's largest wire braiding machine specifically designed for the manufacture of hose is now in production at Thermoid's modern Nephi, Utah, plant. The possession of this equipment enables Thermoid to make wire braid hose in larger sizes and with greater strength than had previously been possible.

Hoses of 2, 3 or 4 braids can be made on this machine in sizes up to 2½" I.D. That means Thermoid can make hose that will rival pipe in strength but still have the flexibility of rubber. The specifications of Thermoid's hose for carrying high pressure are superior to any current production on the market.

If Pressure Is A Problem

In addition to the hoses specified below, this Thermoid equipment is available for special designs involving construction of hose for high pressure work. If you have a hose use where pressure is a problem give us the overall facts. We will undertake to work out a practical design that can use the unusual capacity of this machine to produce a stronger, more compact hose than could be made by any other method or equipment.



Powerflex Wire Braid Hydraulic Hose

Can now be produced in sizes from 3/16 to 2" I.D. in 50 ft. lengths, in 1, 2, 3 or 4 braids, working pressures from 500 to 5,000 lbs.

Powerflex Wire Braid Steam Hose

Practically burst-proof because of the wire braid reinforcing.

Recommended for pressures up to 200 lb. saturated steam. Specially compounded tube resists heat—asbestos cord layer dissipates heat and forms a permanent bond to the tough, rubber cover. Available in sizes ½ to 2½" I.D. and in lengths up to 50 ft.

The Thermoid line includes: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Custom Molded Products • Industrial Brake Linings and Friction Materials.

Thermoid

Thermoid Company · Trenton, N. J., U. S. A.

Automotive · Industrial · Oil Field · Textile Products

CLEANS ANY FACTORY FLOOR IN 1 FAST, EASY OPERATION!

It's a fact! *Traffic-packed grime . . . incrusted grease, dirt and metal cuttings . . . rubbery layers of dried paint . . . granite-hard blobs of spilled concrete*—in fact *any* kind of soilage on floors can be whisked off in minutes with a Tennant Floor Machine.

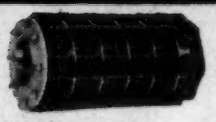
Expressly designed for tough jobs that usually take hours or days of tedious hand scraping, the self-propelled Tennant Machine cleans any floor in one operation. And it's an easy one-man job. There's no scraping, no messing with water or chemicals, no "sweeping up" to do.

Dirt is cut loose with fast-cutting drum type steel wire brush or Revo-tool, then hurled into built-in soilage hopper; lighter dust is sucked into vacuum bag. Action of high speed 12" or 16" brush smooths and levels floor surface.

Result: a smooth, clean, *dry* floor—ready for immediate traffic.

6 TYPICAL ADVANTAGES

1. **REQUIRES ONLY 1 MAN.**
2. **CUTS CLEANING COSTS as much as 50%.**
3. **DRY CLEANS; no messy chemicals or water.**
4. **REDUCES HAZARDS; keeps floor dry, smooth.**
5. **CLEANS ANYWHERE; doesn't halt plant operation.**
6. **IDEAL FOR ANY TYPE of shop floor.**



NEW REVO-TOOL . . . 9,856 *Impacts Per Second!*

Has hundreds of drum-mounted alloy-steel cutters to provide a scarifying and pulverizing action for cleaning and leveling floors. High speed hammer-mill action removes grease, tar, chips, paint, cement.

STEEL WIRE BRUSH

Contains twisted tufts of strong steel wire (20, 30 & 39 gauge) mounted in diagonal pattern—won't clog nor streak. Brush is reversible for self-sharpening. Excellent for average soilage. Revolves at 1760 RPM.

TENNANT machines are available with electric or gasoline motors.

WRITE or WIRE TODAY for a FREE inspection of your floors. There is a TENNANT factory representative in your vicinity.

The way to finer floors
TENNANT
Floor Maintenance System

G. H. TENNANT CO.
2554 N. 2nd Street • Minneapolis 11, Minn.

tops, and bottoms; silver-soldered elbow pads; projection welded hanger loops; wide bottom handles; interchangeable caps, collars, and gaskets; spotwelded nameplates with identifying colors for each type of unit; transparent plastic nozzle. American-La France Foamite Corp., Elmira, N. Y.

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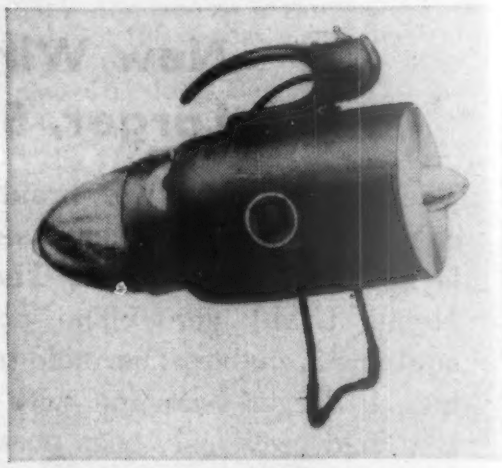

Fog-Making Exterminator

Portable fog-making unit, Microsol No. 202, produces an insecticide fog without the use of heat in any form. By means of electrically powered centrifuge, it is said to break down the insecticide material into microscopically fine particles light enough to be airborne and to project them in the form of a swirling, billowing fog which filters into cracks, crevices, and inaccessible hiding places. Device may also be used for dispersion of germicides, deodorizers, air-refreshers, sterilizing agents, and other liquids. The Mitchell-White Corp., 12 East 22nd St., New York 10.

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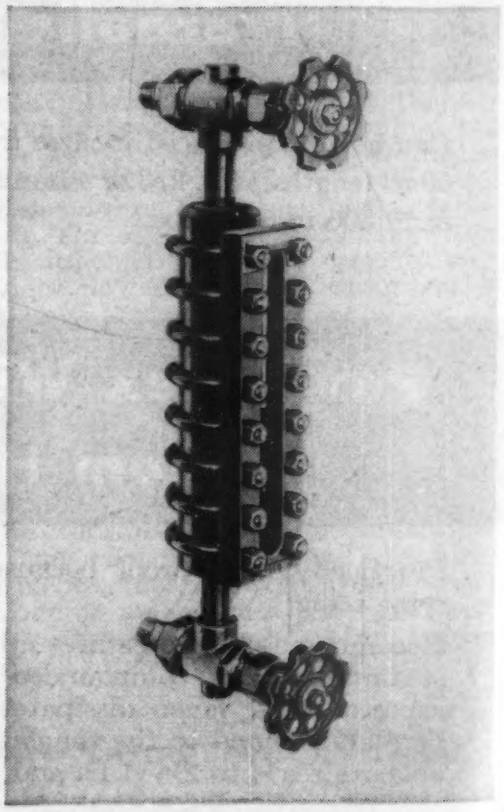
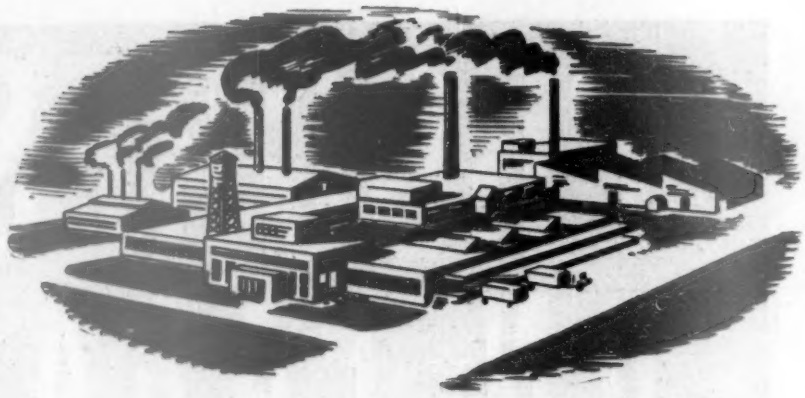


Liquid Level Indicator

Liquid level gage for use in gaging liquids whose levels fluctuate rapidly in the glass has been built with a large chamber to minimize the effect of such action. This, according to its maker, allows close level read-

Where business is busiest...



Where cost reduction history is made....

Look for New Britain Automatics

Visitors to the modern New Britain plant often remark that we seem to leave no step untaken to make the finest machines it is possible to turn out. This is perfectly true. New Britain automatics are not built down to a price, but up to a high standard in the belief that the least expensive machine actually is the one that will turn out the most pieces per dollar for the longest time.

In our 800,000 square feet of modern manufacturing space are many advanced production machines and techniques at work in the manufacture of the 25 different New Britain models. Here our engineers and those of other leading American concerns are teaming up to produce better, lower cost machining for the future. Yet you will find skilled "old timers" painstakingly hand scraping ways and topflight assembly men testing and running-in each machine before tooling. Practical tooling is applied by engineers of long experience in making metal cutting a cost cutting operation.

You'll find the same spirit at work when your New Britain automatics are set up and running on your floor. We consider no transaction complete until the customer has the maximum accuracy and production of which his New Britain automatics are capable.

THE NEW BRITAIN MACHINE CO. NB

Would you like to see some examples of how New Britains pay off on the job? Send for the New Britain portfolio of "Cost Histories" which gets right down to cases on specific jobs. No charge, no obligation, of course.

1248IB1

NEW BRITAIN
Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

PROGRESS ON PARADE at the

NINTH
Air Conditioning Exposition
INTERNATIONAL HEATING & VENTILATING EXPOSITION
INTERNATIONAL AMPHITHEATRE • CHICAGO
JANUARY 24–28, 1949

Striking advances in equipment . . . the latest trends and practices—newest and best ways to heat, ventilate and air condition all types of industrial plants—a wealth of practical, cost saving ideas—are in store here for plant management and operating officials. Greatest display of its kind ever assembled, its informative, technically-staffed exhibits and demonstrations will afford unequalled opportunity to see and compare at one time hundreds of new and improved items from complete units to maintenance supplies—to discuss your specific plans, problems and requirements first-hand with engineering specialists.

Because of today's rapid advances in these active fields, no plant owner, manager, operator, architect, or engineer, concerned with providing these vital services in any branch of industry can afford to miss this outstanding display of progress. So plan now to attend—note the date.

Under Auspices of American Society of Heating & Ventilating Engineers

Management International Exposition Company

ings, often needed for safety and accurate control. The gage, suitable for use on light end services, or as a visual standpipe, is of the flat glass, reflex type, and is made in sections up to any desired length, in multiples of manufacturer's standard No. 7 reflex glasses. Jerguson Gage & Valve Co., 80 Fellsway, Somerville 45, Mass.

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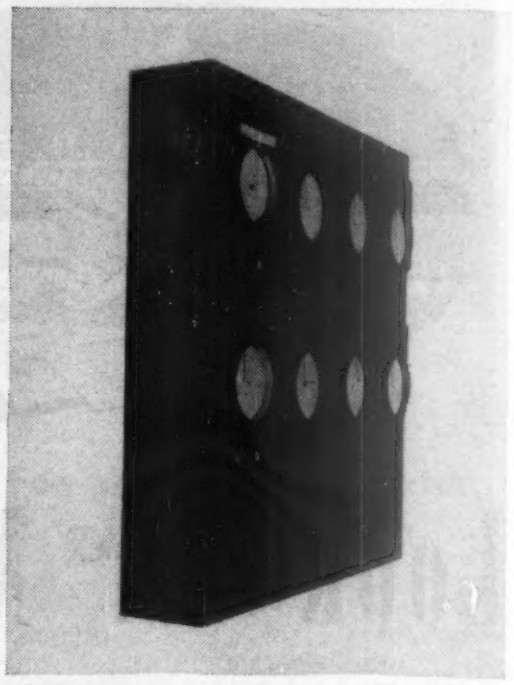

Cubicles

Standard line of cubicles, designed to contain control, recording, and indicating instruments, is fabricated of 10-gage steel. All units are equipped with hinged access doors in rear. Two types are available. Type No. 1 comprises individual cubicles, any number of which can be bolted together to meet varying plant operating conditions. Type No. 2 consists of a specified number of cubicles welded together as a complete unit, but with a divided front, simulating individual sections. When intended for use under hazardous conditions involving gases, vapors, or dust, cubicles can be fabricated with vapor-sealed doors and with seams welded gas-tight. Available in widths of 18, 24, 30, and 36 inches; in depths of 12, 15, 18, and 21 inches; and heights of 72, 78, 84, and 96 inches. A lighting hood designed to provide glareless illumination over instrument bases is also available. K & H Industrial Products, Inc., Dept. 9, 459 Morgan Ave., Akron 11.

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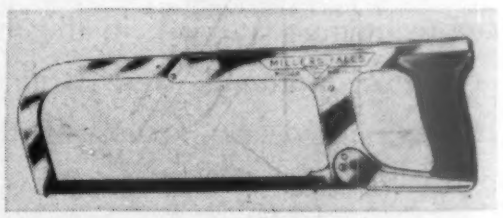

Hacksaw Frame

Lever action said to apply uniform tension on blades and allow fast blade changes is a feature of hacksaw frame made of 3/16x¾-in. steel. Adjustable for either 10- or 12-in. blades. When the lever on the bottom of the frame handle is pulled down, cam mechanism releases tension so that blade may be inserted

CAN YOU BEAT IT?

10 SECONDS to cut 2 1/2" Electric Cast Steel

ATKINS "Curled Chip" MILLING SAWS

To be sure milling saw performance like this — reported by one Atkins user — is outstanding, even for an Atkins. But it does show why it will pay you to take a long, careful look at your own cutting operations.

It's easy to see why the Atkins "Curled-Chip" Method of metal cutting so often results in sensational reductions in cutting costs. Where the conventional angular tooth must push against a vertical face, the inward-curving Atkins "Curled-Chip" Tooth gets *under* the chip and *lifts* it in a continuous clockspring-like coil. Result: less tooth-dulling heat — faster cutting speeds — heavier feeds — cleaner, truer cuts that need less re-machining.

To find out just what this can mean to you, check with your distributor today. Ask him to have an Atkins Cutting Engineer arrange a demonstration on any work you choose.

ATKINS "CURLED-CHIP" SEGMENTAL SAW

Engineered to increase cutting under the toughest demands of heavy-duty sawing machines. "Curled-Chip" teeth in segments permit consistently narrower cutting width. Worn-out teeth can be quickly replaced without discarding the saw disc.

ATKINS "Silver Steel" SAWS

E. C. ATKINS AND COMPANY • *Home Office and Factory:* 402 S. Illinois Street, Indianapolis 9, Indiana
Branch Factory: Portland, Oregon • *Branch Offices:* Atlanta • Chicago • New Orleans • New York • San Francisco

AAA TRADE MARK ATKINS "ATKINS ALWAYS AHEAD"

MAKERS OF BETTER SAWS FOR EVERY CUTTING JOB

OUT OUR WAY
SO YOU FERGOT TO PUT DOWN SOL-SPEEDI-DRI, EH? MEBBE IF YOU BREAK A LEG, OR YOUR NECK, OR SUMPIN, YOU'LL REMEMBER! JEST LISTEN TO SOME OF TH' OLD-TIMERS AROUND HERE-- THEY'LL TELL YOU IT AIN'T HEALTHY TO FERGET TO PUT DOWN SOL-SPEEDI-DRI!
THAT KID BETTER KEEP ON HIS TOES! BUT BEFORE HE CAN DO THAT, HE'S GOTTA PUT DOWN SOL-SPEEDI-DRI SO HE CAN KEEP ON HIS FEET!
REMEMBERIN' AIN'T ENOUGH! IT'S REMEMBERIN' NOT TO FERGET THAT'S IMPORTANT!
J.R.WILLIAMS
THE LECTURE
COPR. 1945 BY NEA SERVICE, INC. T. M. REG. U. S. PAT. OFF.

Remember the Name . . . SOL-SPEEDI-DRI!

More Sol-Speedi-Dri is used in America's busy shops and plants than any other product of similar nature. Industry has learned that it can count on the unvarying quality of Sol-Speedi-Dri . . . the original and foremost absorbent for all liquids. It is this quality that assures you cleaner, brighter, safer floors . . . freedom from slips and falls caused by oil- and grease-soaked surfaces. In addition, Sol-Speedi-Dri costs *less* per pound because it does *more* work . . . because it is always efficient, always dependable.

Sol-Speedi-Dri is obtained by selective mining, is laboratory-checked hourly, and is processed by the most modern methods and equipment. It is packed in special moisture-proof bags, assuring maximum absorption at the time of application. Don't take chances . . . say Sol-Speedi-Dri, and be safe!

WHEN YOU BUY, BE *SURE* IT'S SOL-SPEEDI-DRI!

Safety and Maintenance Co., Inc., No. 1 Wall St., New York 5, N.Y.

Warehouse Stocks Maintained in Principal Cities of the United States and Canada

facing in any one of four directions; the lever is snapped back into position, automatically applying correct tension on the blade. Manufacturer's "Tuf-Flex (R)" flexible blade is supplied with each frame. Millers Falls Co., Greenfield, Mass.

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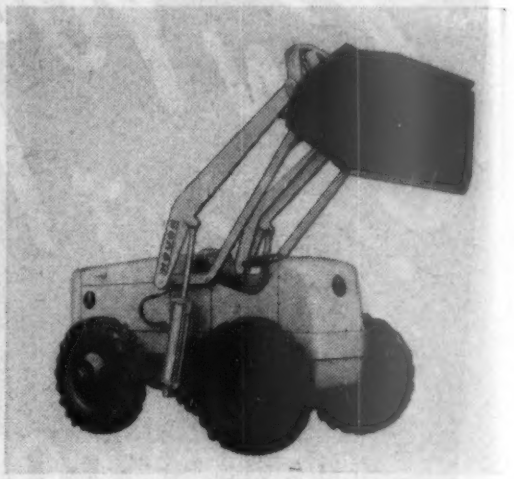

Tractor Shovel Unit

Known as the Model HM Payloader, tractor-shovel unit features a four-wheel drive and a power-boosted steering mechanism. Bucket capacity is 1½ cubic yards, and static loading capacity is of 6000 pounds. Unit has a 76-hp. engine, and 14.00-24.00 tires on all four wheels. Both the bucket raising and lowering and bucket dumping and closing are accomplished by double-acting hydraulic rams, fingertip controlled. Bucket booms are so designed that an automatic digging action is given to the buckets independent of the forward motion of the tractor. Automatic tip-back of the bucket prevents spillage. Designed to dig, to load trucks and other vehicles, to spread, level, strip, skim, carry, and bulldoze, to charge hoppers and conveyors, to plow and load snow, to lift and push. The Frank G. Hough Co., 801 North Sunnyside Ave., Libertyville, Ill.

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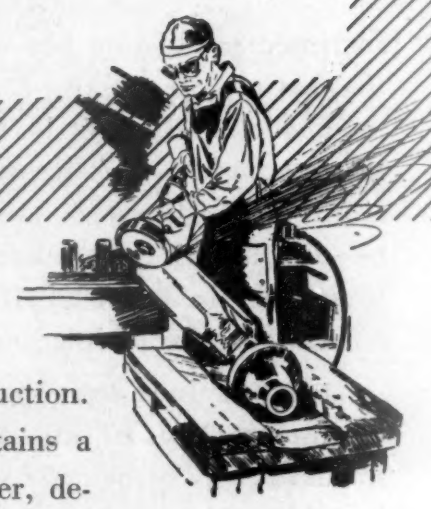
High-Speed Photoelectric Counters

Photo-electronic counter, Model 310, can be used at counting rates up to 6000 per minute. The device is a self-contained package, including photo-electric detector, one electronic decade, and a six-digit electromechanical register. The light source is in a small separate housing. Counts small objects, as well as closely spaced parts, since the photo-electric beam is only ¼ inch wide, and responds to light changes as

This Steel Clad Grinder

can take it!



One of the chief points kept in mind in the complete redesigning of CP's line of pneumatic grinders was the ruthless treatment a grinder commonly gets. Hence—the CP Steel Clad Grinder that can take a tough beating and stay in constant service.

A steel frame, with eutectic welded steel construction used for the first time in any grinder—plus an air motor of increased horsepower, unsurpassed in power by any other grinder on the market—with speed controlled by the CP governor—makes an unmatchable tool for sustained production.

With its reserve power it maintains a constant speed. Thus the 6″ grinder, designed for 6,000 r.p.m., runs at that speed regardless of how hard the operator bears down or however tough the work.

The foreman likes the Steel Clad Grinder because it remains on the line, instead of being in the repair shop. The piece worker likes it because it increases his output, without increased effort.

Write for Bulletin SP-2068

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Here's a proved method for INCREASING WORKER PRODUCTIVITY

Increased production per worker can be accomplished. One way that has proven effective for many leading American companies is use of the Bausch & Lomb Industrial Vision Service. Results show that production efficiency of workers is directly dependent on visual ability . . . that every job has definite visual requirements which can be scientifically determined. Don't blame an employee if he is a round peg in a square hole. Test all present and prospective workers scientifically for job placement.

The B&L Industrial Vision Service sets up visual job standards against which visual skills are compared. Those failing to meet the standards may be helped by professional eye care or may be transferred to a job where their vision is no longer a handicap and often an asset.

The B&L Industrial Vision Program positively demonstrates its value by increasing worker production . . . also improving quality, reducing accidents, decreasing training costs and labor turnover, and boosting employee morale. This service can help your company. Look into the plan today.

BAUSCH & LOMB

OPTICAL COMPANY ROCHESTER 2, N.Y.

Industrial Vision Department
Bausch & Lomb Optical Co.
650-Y St. Paul St., Rochester 2, N. Y.

Please send me a copy of "Vision in Industry" and details of the Bausch & Lomb Industrial Vision Service.

NAME .....

TITLE .....

COMPANY .....

STREET .....

CITY ..... STATE .....

small as 25 per cent. For counting shaft rotations without physical contact, Model 311 electronic counter is available for use with an electromagnetic pick-up coil. Potter Instrument Co., Inc., 136-56 Roosevelt Ave., Flushing, N. Y.

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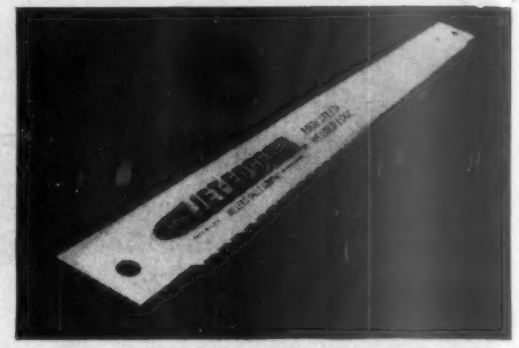

Hacksaw Blade

Shatterproof, high-speed hacksaw blade, named Jet-Edge, has a hard cutting edge welded to a tough, unbreakable back, claims its maker. Available in lengths from 12 to 30 inches, widths from 1 to 2½ inches, in varying thicknesses and numbers of teeth per inch. Millers Falls Co., Greenfield, Mass.

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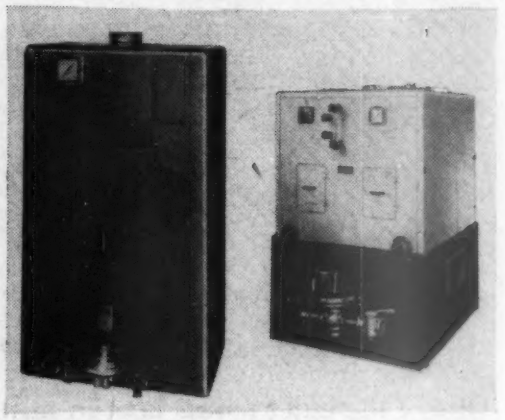

Boilers

Line of boilers designed to use either gas or oil includes both high- and low-pressure models. Copper tubes used in their construction are said to give quick transfer of heat from flame to water. Suitable for jobs demanding day-in and day-out service, as well as those requiring intermittent power. Automatic controls maintain constant steam pressure anywhere between 1 and 125 pounds. Bryan Steam Corp., Peru, Ind.

•

Bronze Globe, Angle Valves

Feature of three types of 300-lb. bronze globe and angle valves is the interchangeability of the disk-and-seat combinations for full portway and throttle portway use. Types include either heat-treated stainless steel plug disks and seats of approximately 500 Brinell hardness, or nickel alloy radial disks and seats. All are constructed with back-seated rings having a pressure-tight joint between ring threads and line pressure. Stem is said to be resistant to corrosion, abrasion, and distortion; the line contact formed by the radial bonnet-to-body joint to be pressure-tight. Nickel alloy radial disk and seat type is available for service up

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the LINCOLN way—cuts costly "down-time"

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LOS ANGELES—Lincoln Engineering Co. of Calif.—Richmond 0151
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True case history: Rubber equipment users regularly get replacement parts by Air Express so machines won't stand idle. Recent shipment: 102-lb. carton picked up 5 P.M. the 18th in Noblesville, Ind. Air-rail to Dallas, delivered 9 A.M. following day. 799 miles, total cost only $26.78. Any distance inexpensive, too. Phone local Air Express Division, Railway Express Agency, for fast shipping action.

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to 300 pounds pressure where throttling is not required, but pressures and operating conditions tend to shorten valve life. For severe operating conditions where some throttling is required, full-port stainless steel plug disk and seat is available. Suitable for severe service is the throttle-port stainless steel type for use where constant throttling is required. Angle valves are available with the same combinations as globe valves, in eight sizes from ¼ to 2 inches. The Fairbanks Co., 393 Lafayette St., New York 3.

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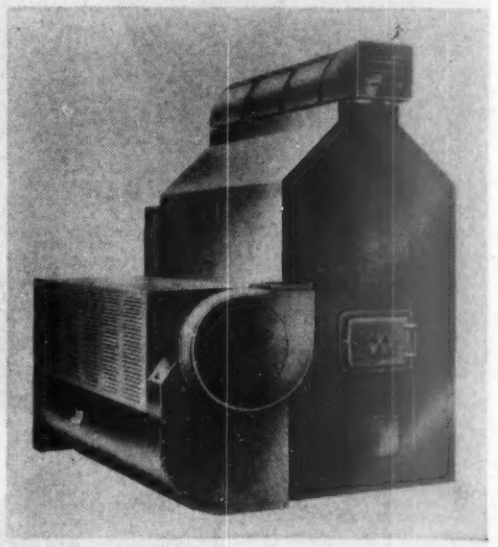

Convertible Air Heater

Coal-fired warm air space heater, which can be converted for firing with gas or oil, has a stainless steel combustion chamber. Air is drawn into the base, passed over economizer tubes in combustion chamber, and discharged through overhead nozzles. Heater can be used with or without ducts, can be adapted to bring in and heat outside air for applications that require tempering make-up air. Manufacturer claims that it also may be used for summer ventilating and is adaptable for process drying and curing. Standard equipment includes a hopper model bituminous coal stoker. Anthracite or bin feed stokers can be supplied. Automatic operation of fans and stokers is controlled by room temperature thermostat. A timer operates the stoker for short periods to maintain fire during mild weather. Available in two output capacities: 1,250,000 B.t.u. per hour, and 1,500,000 B.t.u. per hour. Dravo Corp., Fifth & Liberty Aves., Pittsburgh 22

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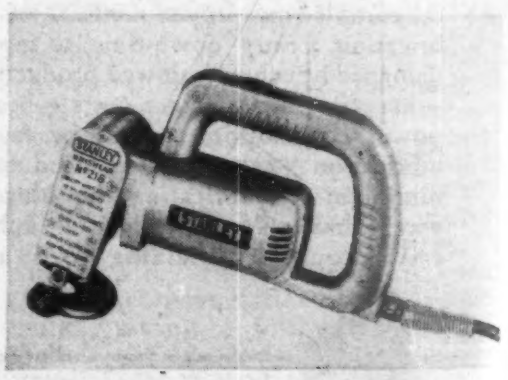


Metal Shear

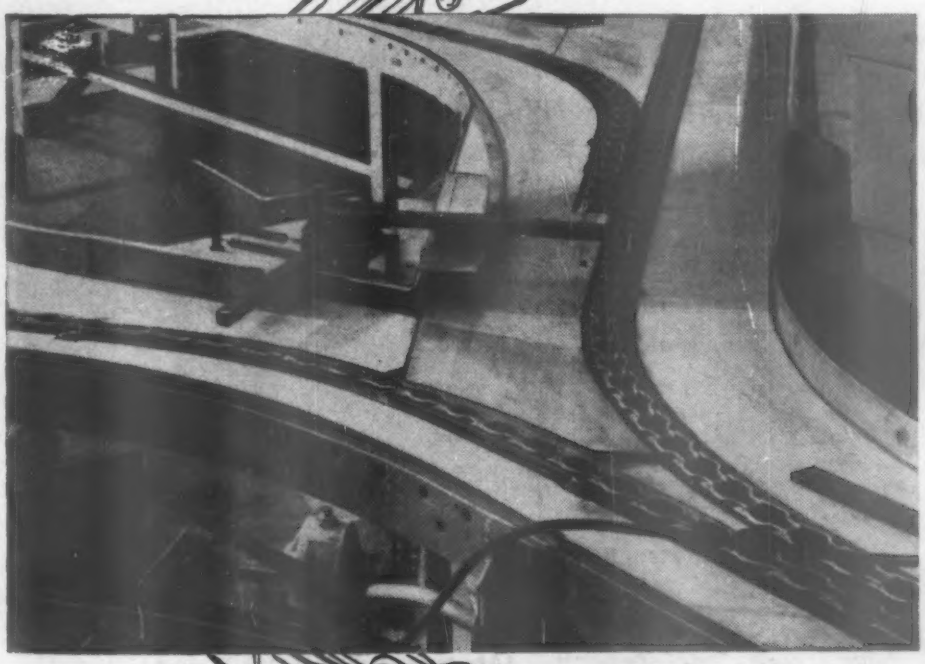
Developed to cut 18-gage mild hot-rolled steel and similar materials at a speed up to 15 f.p.m., metal

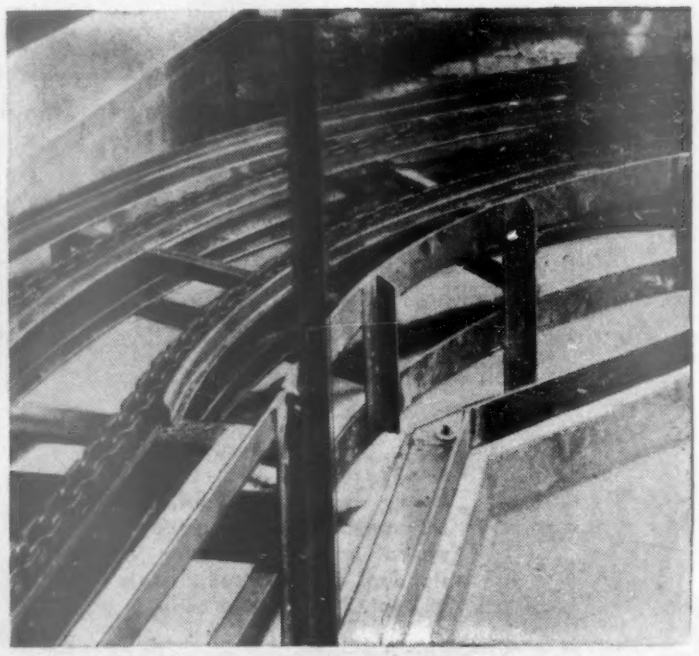
flexibility *that saves floor space!*

• Rex Double-Flex Chains help you make the most effective use of your floor space. . . simplify conveyor set-ups. Their unique ability to flex in two planes enables them to make horizontal turns, thus making it possible to weave around beams and other obstructions.

These space-saving chains provide an ideal means for carrying cartons, boxes, large cans, packages and parts into and away from plant unloading or delivery points. They are also effectively used in packing lines and assembly tables.

Rex Double-Flex Chains are made of Rex Z-Metal for maximum resistance to corrosion and abrasive sliding wear. Links have added wearing surfaces on sliding edges. Rex Double-Flex will outlast any similar type chain. For all the facts, call your local Rex Field Office or write Chain Belt Company, 1667 West Bruce Street, Milwaukee 4, Wis.





- *Rex Double-Flex Chains can be turned to converge at one delivery point to considerably simplify handling problems and step up efficiency.*
- *The ability of Rex Double-Flex to weave around obstructions simplifies conveyor set-ups . . . makes most effective use of floor space.*

CHAIN BELT COMPANY **REX** . . . DRIVE AND CONVEYOR CHAINS

Photo courtesy The Astatic Corporation, Conneaut, Ohio

"The only Satisfactory way"

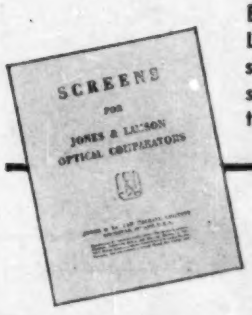
Checking a phonograph precious metal needle cartridge for stylus projection, tip radius and included angle on a Jones & Lamson 14" Pedestal Optical Comparator.

"We find this the only satisfactory way to check such small parts, as the tip radii range from .0028" to .003". In addition other important dimensions can readily be checked."

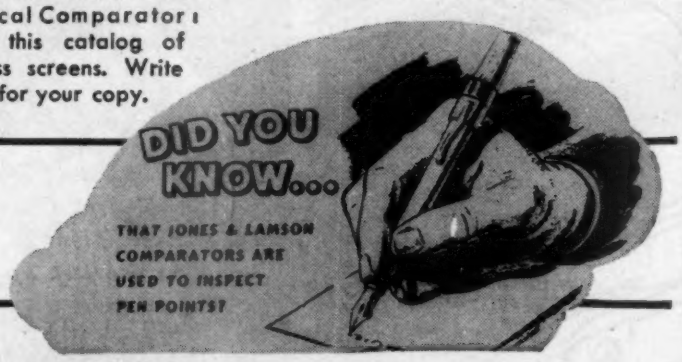
Says The Astatic Corporation, manufacturer of sound reproducing equipment, who use Jones & Lamson Comparators to help maintain the highest standards of operating efficiency for its products.

Many components and products formerly inspected by slow, tedious methods, that retarded production and drained profits, are now inspected in seconds or minutes on Jones & Lamson Comparators, by operators with only a minimum of instruction. Savings are made all along the line, in gage cost, in time and in overhead.

Our engineers are inspection specialists; their knowledge of holding fixtures, handling methods and suitable Comparator equipment has saved hundreds of thousands of dollars throughout the country. Call, write or wire for their services today.



Every owner of a Jones & Lamson Optical Comparator should have this catalog of standard glass screens. Write to Dept. 710 for your copy.



Optical Comparator Division

J&L JONES & LAMSON MACHINE COMPANY Springfield, Vermont, U.S.A.

MACHINE TOOL CRAFTSMEN SINCE 1835

shear, called No. 218 Unishear, weighs 4¾ pounds. Blade action "feeds in" the work so that straight lines, curves, angles, and notches can be cut accurately. Ball and roller bearing construction, automatic lubrication of plunger from gear housing, slide operated switch, are features of the device, which is furnished with rubber-covered three-wire cable, wrenches, clearance gage, and a supply of lubricant. Standard model uses 115 volts; other voltages available. Stanley Electric Tools, New Britain, Conn.

•

Print Drier

Rotary drier for photo copies, blueprints, and similar reproductions, dries both glossy and matte finish prints. Features include built-in squeegee, stainless-steel drum, adjustable curtain tension, two-heat temperature control, jewel warning signal in *on-off* switch, all-welded case. Lott Mfg. Co., Jamestown, N. Y.

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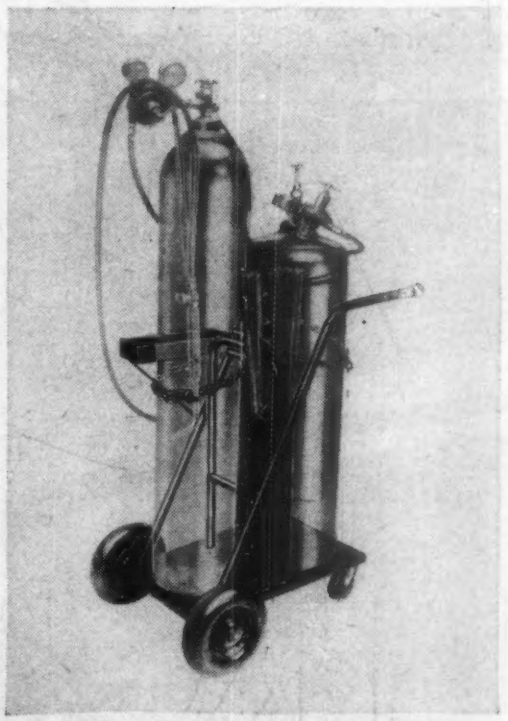
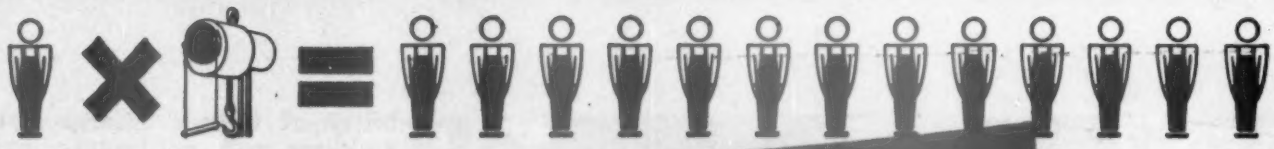


Welding Equipment Carrier

Four-wheel cart for gas welding equipment, called No. 1 Welder's Helper, provides for the mounting of cylinders on a 21-in.-wide platform, 5½ inches above floor level. Carrier can be moved around obstructions and taken to jobs in tight corners, and is large enough to carry both a 12- and a 9-in.-dia. cylinder. Chain locking cylinder grip is adjustable for various sizes. Four 10-in. wheels carry the load, eliminating possi-



Multiply Your Manpower... 13 Times

Tests show that the powerful new Whiting Electric Hoist lifts loads up to two tons, 13 times as fast as a hand hoist . . . releasing men and machines for productive work. In addition to savings from increased output, the initial cost of a Whiting Hoist is low . . . only $230.00 for the one-ton size. Because of its simple, worm-gear design, there are fewer parts to wear . . . reducing maintenance expense to a minimum. Even when used only a few minutes each day, these hoists pay for themselves in a very few months.

Workers like Whiting Hoists, too, because they make it so easy to lift back-breaking loads. They can be installed by one man, yet are so rugged they will stand up under heavy duty.

Whiting Hoists are available for polyphase or single-phase operation. It will pay you to investigate this new time- and money-saving hoist, today.

ONE-TON SIZE COSTS ONLY $230.00

If it Saves One Man Only 12 Minutes a Day ...IT PAYS A PROFIT!

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ELECTRIC HOISTS

¼, ½, 1, and 2-Ton

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WHITING CORPORATION

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☐ Send me a copy of your Bulletin H-100A describing the new Whiting electric hoist.

☐ Please send me the name of the Whiting distributor in my territory who can give me immediate delivery on a Whiting hoist.

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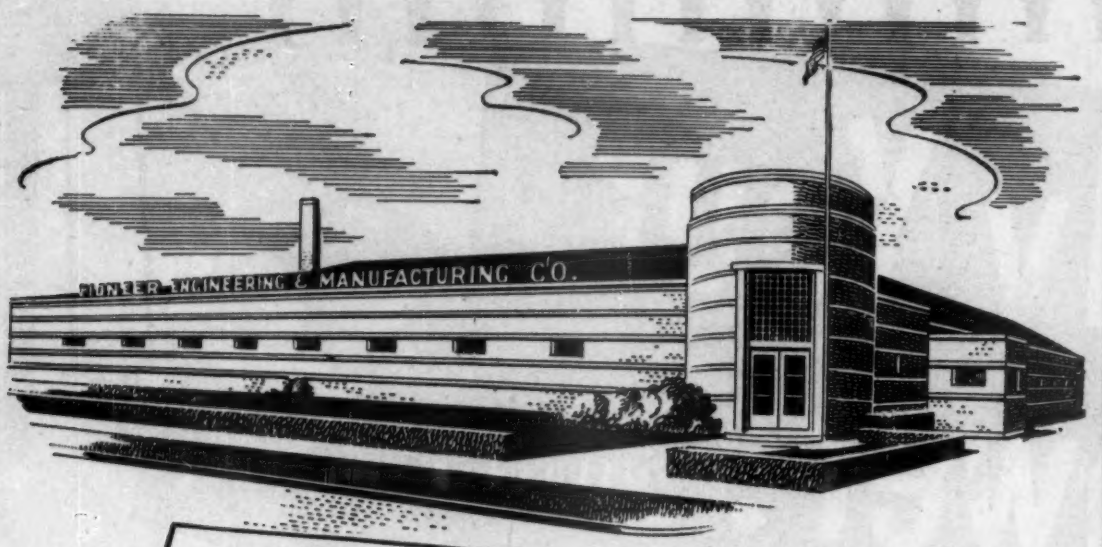

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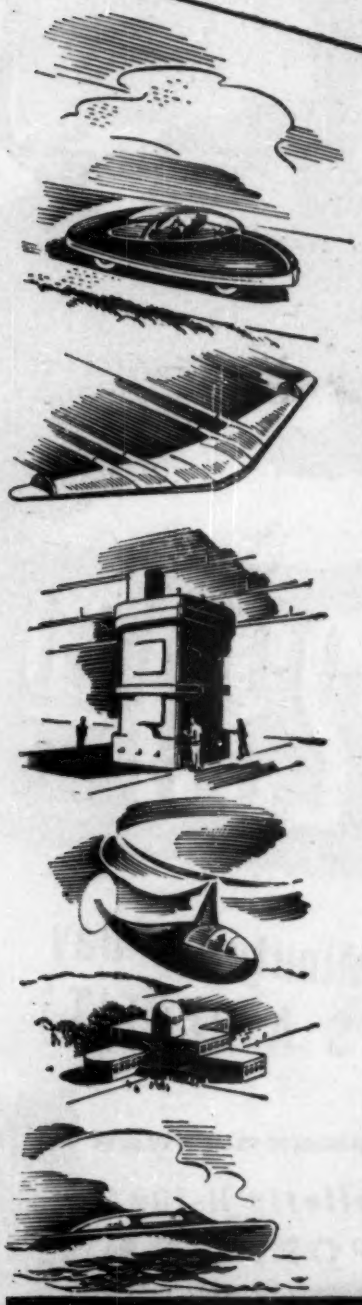

. . . AT YOUR COMMAND

Engineers, designers, tool and die experts, production specialists — the entire Pioneer staff is at your command. They will work for you in solving a simple problem such as the design of a tool, die or fixture; or they will work equally well in solving your bigger problems.

Their accumulated experience and skill on many different products frequently points up your answer in shorter time. And with costs mounting at every turn, it is doubly important to investigate every avenue by which these costs can be lowered. Let us take some of the burden off your shoulders.

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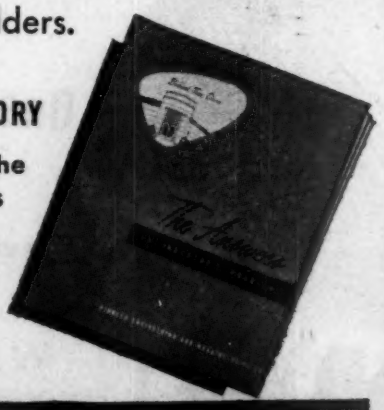
. . . Ask for a copy of "The Answers To Industry's Problems". This brochure explains in detail the many services available from Pioneer.



Pioneer Engineering and Manufacturing Company

19644 JOHN R ST., DETROIT 3, MICHIGAN

PIONEERing Better Production Methods and Tools

bility of tipping. Large cylindrical welding rod containers hold supplies of six different rods; parts and accessory box on the side carries additional equipment. A fire extinguisher can be mounted below the parts box. Downward pressure on the steering handle acts as a brake on inclines. Gleason Corp., 534 Ninth St., Milwaukee 3.

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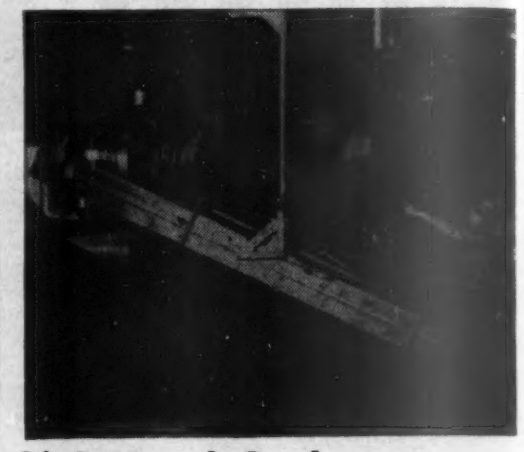

Light-Load Grab

For handling tubing and other materials that are unwieldy and more or less fragile, a grab is constructed of welded steel, weighing approximately 150 pounds. It supports long crates at the bottom end, as well as at two points on each side. The four side supports slide either under or away from the crates by a toggle arrangement operated by a lever located on the main beam. The grab pivots at approximately the center of a crate, so that it may be turned from horizontal to vertical position, or *vice versa*. When loaded, crates are transported in a vertical position on an overhead conveyor. Grabs can be supplied for crates of various sizes and capacities for use on manufacturer's overhead materials handling systems. The Cleveland Tramrail Div., The Cleveland Crane & Engineering Co., Wickliffe, Ohio.

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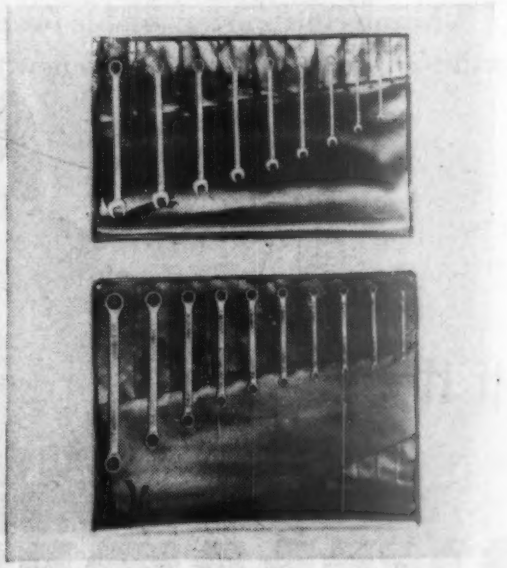

Long Wrenches

Six box wrenches and nine combination box and open-end wrenches with longer-than-standard shanks are said to provide good leverage, holding power, clearance, and reach. The six double-end box wrenches, with openings from 5/16 to ¾ inch, have rounded shank edges, chamfered openings on both sides, die-

formed size markings, and a triple plating to resist rust. The nine combination wrenches, with openings from ¼ to ¾ inch, have the same features, and have tapered jaws on the open end. Three sets are available. No. 1100K includes three long box wrenches and two standard-length box wrenches; No. 1100M includes all six long box wrenches and four standard wrenches; No. 1200L includes all nine long combination wrenches. Plomb Tool Co., 2209 Santa Fe Ave., Los Angeles 54.

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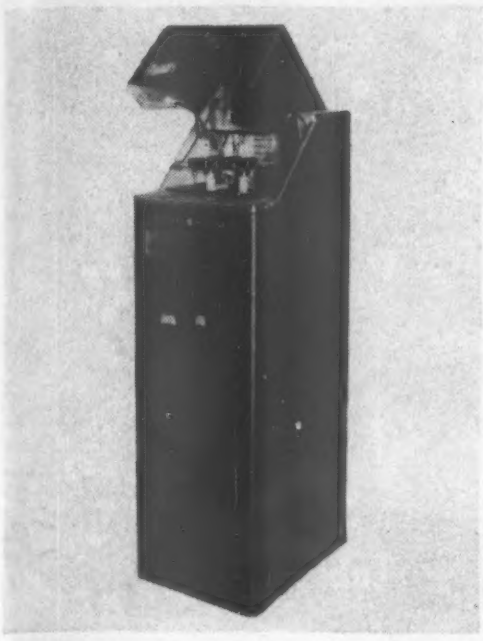

Preheater

Portable 3-kw., 40 megacycle preheater for rapid and uniform preheating of plastic preforms operates on 230 volts, single-phase, 60 cycles, requires 2¼ square feet of floor space. It will heat 40 ounces of wood-flour phenolic compound from 70 to 250 deg. F. in one minute, or 1 pound of this material in 24 seconds. Automatic pop-up cover is said to facilitate preform loading and unloading. Two timers with associated controls permit operation alternately with two presses having different load requirements. One of three meters, the dials of which are mounted on the front of the cabinet, indicate the direct current applied to the oscillator circuit, another shows safe operation of the oscillator tube, the third indicates either oscillator or rectifier filament voltage. General Electric Co., Industrial Heating Div., Schenectady 5.

•

Hand Truck

All-steel box-type hand truck for light parts has four pneumatic tires;

Packaging Materials Cost Slashed

Acme-Morrison Silverstitchers helped make savings of 600% in cost of packaging materials—with increased production in 30% less time

ONE OF THE MACHINES THAT DID IT! An Acme-Morrison Silverstitcher on the job, cutting costs for this fabricator of aluminum.

Excellent results were obtained when B & T Metals Company, Columbus, Ohio, installed Silverstitchers to help package buffed and polished aluminum extruded shapes.

Here are the outstanding facts from this actual case study:

1. **Materials saving—600%. Cost of staples cut 35 cents per thousand.**
2. **Time saving—30%.**
3. **Increased production because of ease of operation, greater efficiency, and less maintenance with Acme-Morrison Silverstitchers.**
4. **Stronger, better-quality packaging for improved handling, better "arrival condition," greater customer satisfaction.**

An Acme Shipping Specialist helped get these results. Acme is ready and willing to work with you on better, more economical packaging for your product in corrugated, solid fibre or special containers. Call the district office nearest you, or mail the coupon for more information.

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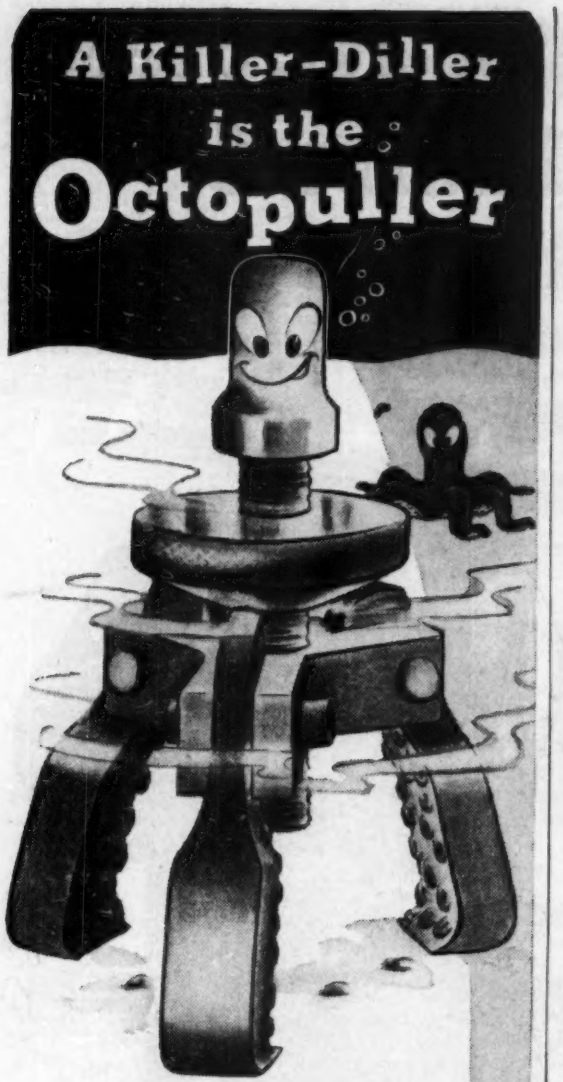

Gears, bearings, wheels, etc., just don't have a chance—once they're grabbed by a puller made by Plomb Tool Company. Even the hardest ones come off quickly when one of our pullers goes to work. The arms are as tough as a 50-cent steak, and they really h-a-n-g on. They're quick-change artists, too. Parts are interchangeable, and you can convert a puller to another job in no time at all—without having to buy a lot of extras. Your dealer is sure to have the pullers you want because

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two pivot wheels at the pushing end permit maneuverability. Hand levers also at the pushing end permit the front side of the box to be unlocked for parts disposal. Rectangular tubular handles at top and bottom provided a means of lifting the box to empty. Boxes are manufactured to customer's specifications. Palmer Shile Co., 16007 Fullerton Ave., Detroit.

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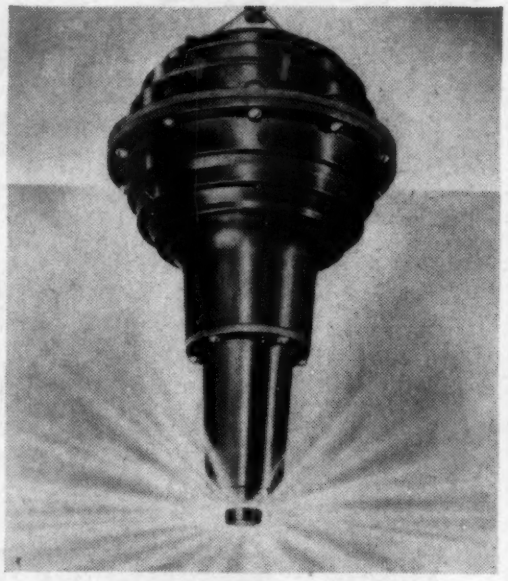

Fire Extinguisher

At 160 degrees, fire extinguisher, called Aut-O-Jet, automatically goes into action, filling the enclosed area it guards with a spray that turns into a thick, fire-suffocating cloud. The device, approximately 12 inches long and 6 inches wide, is installed overhead, so that the cloud it forms can settle down to extinguish the fire below. Spray is ejected under pressure, covering a radius of 10 to 15 feet from the unit. Die-cast aluminum encloses a hermetically sealed glass reservoir containing 1 quart of carbon tetrachloride. All vital parts of the unit are protected from moisture and dust. Aut-O-Jet Co., Multomah, Ore.

•

Ratchet Box Wrenches

Five sizes of double-end alloy ratchet box wrenches, ¼x5/16, ⅜x7/16, ½x 9/16, ⅝x1/16, and ¾x⅞ inch, provide a range useful for all types of maintenance work. Rounded ends permit operation in close places where conventional wrenches are difficult to use, according to manufacturer. Owatonna Tool Co., Cedar St., Owatonna, Minn.

•

Self-Bonding Electrical Tape

When applied under normal wrapping tension, such as in splicing electrical connections, self-bonding electrical insulating tape, called Bi-Seal, is said to cohere to itself and other insulations to produce a permanent insulating jacket. The tape combines a blend of synthetic polymers and resins, and is compatible with butyl rubber, polyethylene, and vinyl resins. Dielectric strength is said to be better than 1000 volts per mil of

"Formica" fits them to a "T".

An insulator for an electrical boat . . . the top of a fine coffee table . . . a long-lasting picker stick for the Textile Industry.

Industrial "Formica" is at work in many industries to make better products at lower cost. Decorative Beauty Bonded "Formica" is at home with people . . . in their homes in restaurants, stores, and public buildings . . . wherever long lasting color and beauty make for better living.

A request to Formica, 4665 Spring Grove Avenue, Cincinnati 32, Ohio, will bring you detailed information on Industrial "Formica", Decorative "Formica", or both. Please indicate.

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Foolproof against static electricity

New Hewitt Non-Spark Sand Blast Hose provides positive protection, long life

Why take chances with static electricity in your sand blasting work?

Use new Hewitt Non-Spark Sand Blast Hose and *eliminate* hazards caused by static electricity.

It's all due to the hose's special tube and cover. Both are made of a conducting compound which *dissipates friction-generated static electricity.* No need to ground the hose, since it grounds itself. So, this new hose can't shock your operators.

You also get extra *toughness*—inside and out. The carcass prevents excessive expansion and tube tension. The cover particularly resists abrasion. As a result, your replacement needs slow 'way down.

Furthermore, you get extra flexibility. Your hose is easier to handle. Your work gets done faster.

For full information about this hose—or about Hewitt Static Wire Sand Blast Hose which dissipates static electricity when grounded—phone your Hewitt distributor. You'll find him listed in the classified section of your telephone book. Or write Hewitt Rubber Division, 240 Kensington Avenue, Buffalo 5, N. Y.

HEWITT

SAND BLAST HOSE

HEWITT RUBBER DIVISION
INDUSTRIAL HOSE • BELTING • PACKING

Here's why New Hewitt Non-Spark Sand Blast Hose is a better value

1. Tube and cover made of special compound which dissipates friction-generated static electricity by conduction. No grounding of the hose is necessary.

2. Extra strong, high-tensile duck carcass resists swelling and tension due to high pressures. Yet the high flexibility of the hose wall permits fast, easy handling.

3. Special conducting cover is specially treated to withstand abrasion. This assures long, economical hose life.

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MODERN MACHINERY

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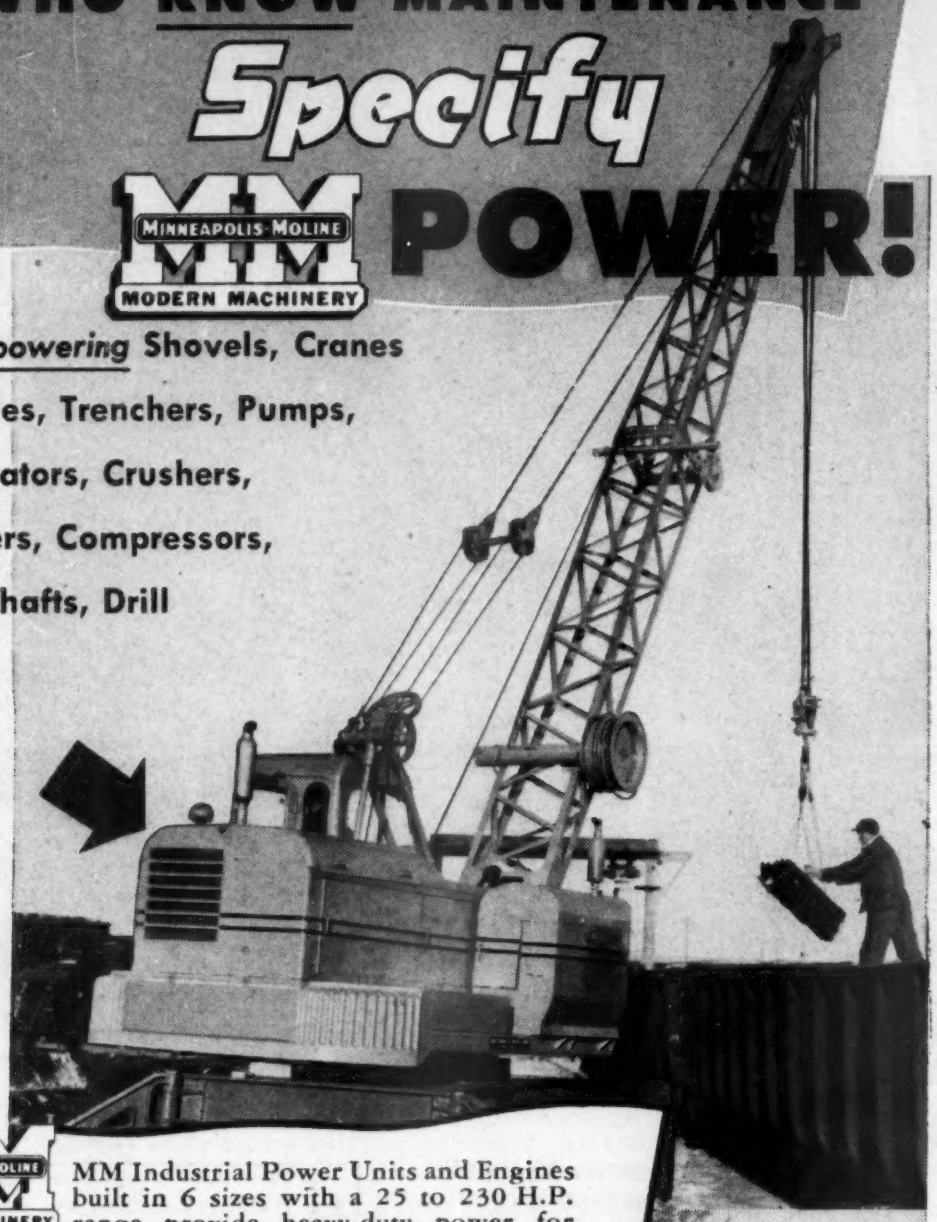
Winches, Trenchers, Pumps,
Generators, Crushers,
Blowers, Compressors,
Line Shafts, Drill
Rigs.



MM Industrial Power Units and Engines built in 6 sizes with a 25 to 230 H.P. range provide heavy-duty power for many types of engine driven equipment. Economical operation on gasoline, distillate, natural gas and LP gas adapt all models for portable or stationary installations.

MINNEAPOLIS-MOLINE
POWER IMPLEMENT COMPANY
MINNEAPOLIS 1, MINNESOTA

thickness. Tape is ozone, moisture, acid, and alkali resistant. Available in 1-lb. rolls of any standard width, in one standard 0.020-in. thickness. Bishop Gutta Percha Co., 420 East 25th St., New York 10.

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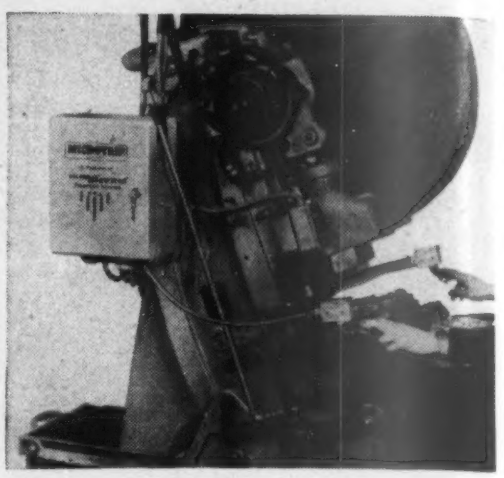


Safety Device for Presses

A two-hand electrical device, called Microtrip, for control of tripping mechanisms on punch presses, riveting machines, shears, spotwelders, and air presses, is designed to keep both hands of the operator out of hazardous areas while the press ram is in motion. Both hands must touch the switch buttons at the same time in order to operate the tripping mechanism. Device consists of a control box, two precision switches, and the necessary tripping mechanism, and can be installed on present equipment. Micro-Switch, Div. First Industrial Corp., Freeport, Ill.

•

Humidifiers

Vaporizing more than one-half gallon of water per hour, humidifier provides diffusion of moisture and room air without ducts, special outlets, air or drain piping. Water flow level is regulated by an automatic float assembly, and with the humidifier's 60-watt motor wired in series with a humidistat, automatic operation is maintained. A smaller unit, with evaporating capacity of approximately one-half gallon of water an hour, can be suspended from the ceiling or installed on a wall bracket as desired. Walton Laboratories, Inc., Irvington, N. J.

•

Pallet-Tiering Device

Flexible method of stacking or tiering wood pallets uses steel alignment cones fastened at the four corners of the wooden pallet by means of an adjustable locknut. These cones fit

WASTE DESTRUCTIVE HEAT!

SAVE PRODUCTION TIME!

Engineers recognize the need of *wasting* heat, as well as *utilizing* heat. Harrison Oil Coolers *waste* heat efficiently, thus insuring uninterrupted production, and lengthening machine life. Consult Harrison engineers.

HARRISON

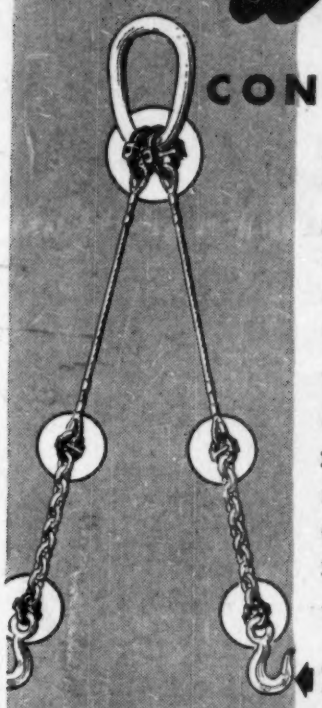
HARRISON RADIATOR DIVISION OF GENERAL MOTORS CORPORATION, LOCKPORT, N. Y.

FOR GREATER SAFETY!

Wedglok

Patented

CONNECTING LINKS



A vastly improved connecting link that combines safety with unique simplicity in assembly. Its strength exceeds the published strength of comparable alloy chain . . . assembles rapidly without the use of special equipment.

WEDGLOK is widely used in steel mills, foundries, structural fabricating plants and other material handling operations in which on-the-spot replacement of links is important. Produced in both regular and pear shape. Sizes from 3/8" to 2 1/2".

Write for price list and data sheet.

Combination sling of wire rope and chain connected by Wedglok safety links

SAFETY • STRENGTH • SIMPLICITY • ENDURANCE

A PRODUCT OF

INTERSTATE DROP FORGE CO.

4069 N. 27TH. ST. MILWAUKEE 9, WISC.

"Coes" Machine Knives

BEST BY TEST

AGRICULTURAL
ENSILAGE
HAY AND STRAW
LAWN MOWER
VEGETABLE
SUGAR CANE

BOOKBINDERS
SHEARS
PASTERS
CUT-OFF
CORNER CUTTERS

DOCTOR BLADES
REFINER
LEDGER
RUBBER

LEATHER
SKIVERS
SPLITTERS
SHOE
FLESHING

PAPER AND PRINTING
GUILLOTINE
BOARD SHEARS
ELECTROTYPE
STOP CUTTERS
SHEETER
MATRIX SHEARS
RAG KNIVES
CORNER CUTTERS

TEXTILE
LEDGER BLADES
SPIRALS
LOOM BLADES

METAL SHEARS
SQUARING
ALLIGATOR

WOODWORKING
VENEER
PLYWOOD
PLANER
MOULDING
BARKER
CHIPPER

SINCE 1830

Coes

LORING COES COMPANY

WORCESTER • MASSACHUSETTS

TRADE MARK REGISTERED MICRO CROUND U.S. PATENT OFFICE

into similar cones detachable from the intermediate vertical support, claims manufacturer, to provide a positive, steady nest tight enough to minimize swaying or movement, and yet permit unhampered removal of the upper pallets. Cones are adapted to pallets of any size, and the vertical supporting tubes are supplied in three different diameters, and in any desired length to accommodate any materials or meet desired specifications. Either single or double-face pallets may be used, and the device can be built to accommodate hand pallet trucks. Paltier Corp., 53 West Jackson Blvd., Chicago 5.

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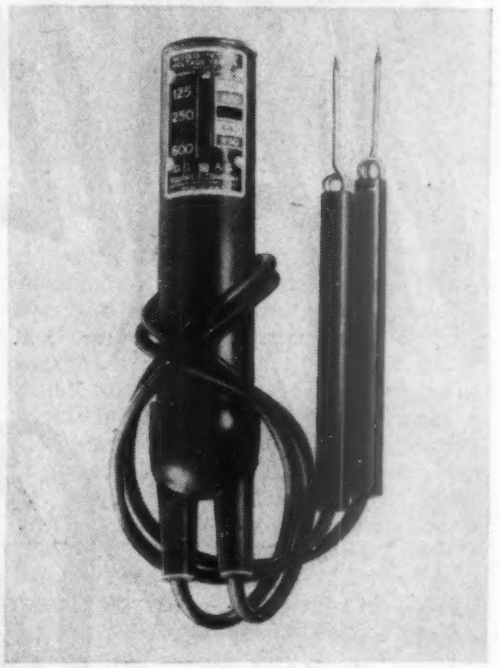

Voltage Tester

Two voltage testers, one for high frequency alternating systems, the other for low-voltage systems, have rubber lead protector, a one-piece fiber tester body, and sharp spear points to pierce insulation for voltage rating without damage. They require no lamps. The high-frequency alternating system tester operates on systems ranging from 110, 220, 330, 440, to 550 volts, a.c., 400 cycles, and 30, 60, 90, and 120 volts, d.c. The low voltage tester is designed for systems ranging from 12, 24, 36, 48, and 60 volts, a.c., 60 cycles, to 10, 20, 30, and 40 volts, d.c. Square D Co., 6060 Rivard St., Detroit 11.

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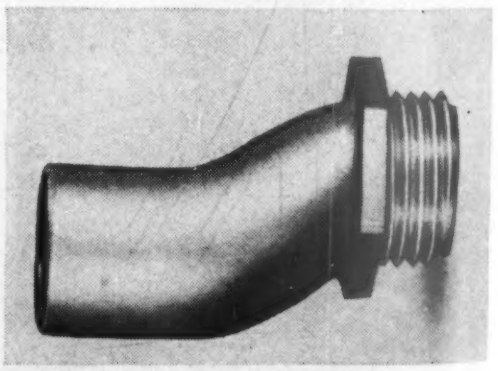


Conduit Adapter

Introducing a line of adaptors, trade named Amadco, ½-in. offset connector, used for tying rigid conduit into terminal boxes, has the offset built into it. This, according to manufacturer, eliminates the two bands required to offset the conduit so that

When you're glad you have a Snap-on

"Tough nuts" in tight spots are easily handled with Snap-on Heavy Duty Wrenches

Reach in, reach over, or under . . . it's all the same to a mechanic using Snap-on wrenches . . . built to service "hard-to-reach" bolts and break loose the toughest nuts. Simply by adding a Snap-on Extension and Socket, the mechanic above converts his Heavy Duty Ratchet to the job at hand and completes it with a minimum expenditure of time and effort and a maximum degree of efficiency and safety. Rapid interchange of units, sure grip, tremendous leverage, and high-speed reversible ratchet action that requires only space for a 20-degree handle movement all explain why this tool is such a favorite with the great majority of top mechanics. Snap-on's Heavy Duty set consists of socket sizes ranging from 7/8" to 2 1/4" together with ratchets, nut spinners, sliding bar handles, universal joints and extensions.

Over 4,000 Snap-on tools are available through Snap-on's direct-to-user tool service. There are 40 direct factory branches located in key industrial areas.

SNAP-ON TOOLS CORPORATION

8044-L 28th AVENUE • KENOSHA, WISCONSIN

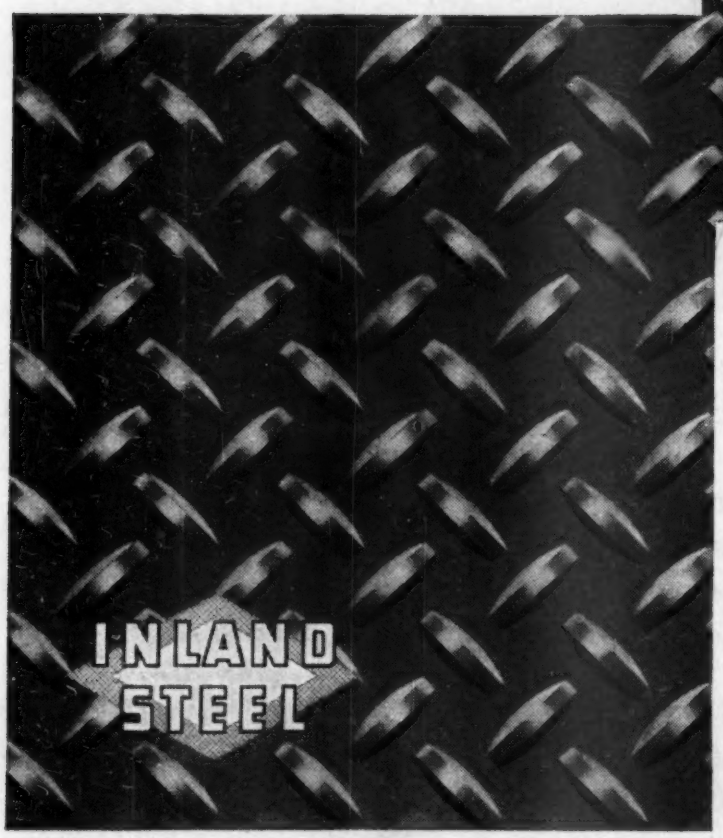
INTERNATIONAL DIVISION: KENOSHA, WISCONSIN, U.S.A

SAFE FLOORS?

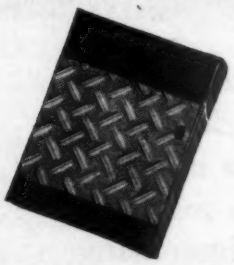
BROTHER, GIVE ME 4-WAY FLOOR PLATE!

This man's right, Mr. Management. Workers appreciate the extra safety they get when you install Inland's modern, skid-resistant flooring in your plant. Its 4-way safety lug pattern provides built-in protection and economy wherever feet or equipment must go . . . floors, walkways, ramps, platforms, steps.

What's more, Inland 4-Way Floor Plate reduces maintenance problems. It won't burn, warp, crack, splinter, or absorb liquids, and it's easily installed. Stocked by leading warehouses.



Write for Booklet



INLAND STEEL COMPANY

38 S. Dearborn St., Chicago. Sales Offices: Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.

INLAND 4-WAY FLOOR PLATE

it will enter the knockout hole in the terminal box. Associated Mfrs. & Distributors Corp., Portland, Ore.

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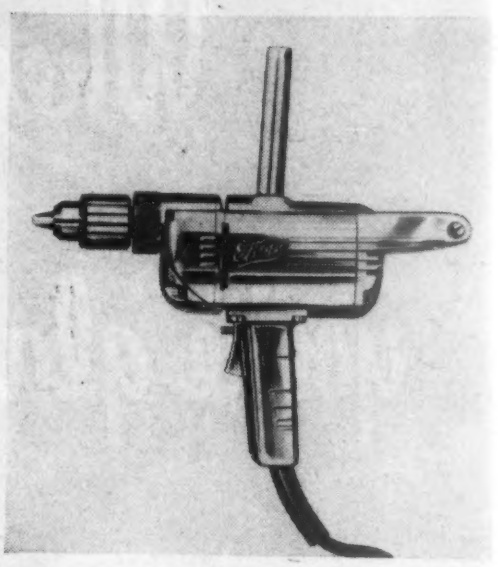


Electric Drill

Seven-pound, heavy-duty electric drill, Silver Line, is designed for continuous metal drilling. Large slotted ports provide ventilation. Drill is 11 inches long, has a free speed of 500 r.p.m., ball-bearing construction, removable dead handle, steel bearing inserts, removable switch handle, 3-jaw Jacobs key-type chuck. Independent Pneumatic Tool Co., 175 State St., Aurora, Ill.

•

Liquid Pumps

Line of pumps, called Industri-Jet, is said to combine the centrifugal pump with jet or ejector in one unit, for relatively small capacities against high pressures. Built in sizes from ¼ to 5 horsepower, capacities up to 35 g.p.m., pressures up to 190 pound, depending on capacity. Suitable for handling cold or hot water, kerosene, gasoline, alcohol, carbon tetrachloride, and similar liquids. Goulds Pumps, Inc., Seneca Falls, N. Y.

•

Packaged Air Conditioners

Two 10-ton-capacity packaged air conditioners are designed for installation remote from the conditioned area. One model, developed for use with a Frigidaire evaporative-type condenser, is suitable for use where the water supply or drainage is limited, where rates are prohibitive, or where ordinances restrict water usage. Self-contained, models may be installed by making power, water, drain, and control connections. High capacity compressors operate cooling units of both models. A 10-hp. water-cooled reciprocating type compressor

Your Material Handling is Easy

WITH PITTSBURGH COLLAPSIBLE CARGOTAINERS

From Production Line

The Cargotainer receives parts as they come from machines. Empty Cargotainers are collapsed, take little space, are light-weight, can be kept handy.

To Storage and Shipping

Fork truck takes filled Cargotainer from production to storage, then loads Cargotainer from storage to truck or freight car. There is no re-handling of parts.

To Assembly

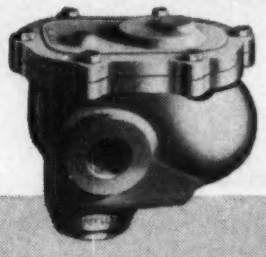
Cargotainers are received and stacked ready for assembly line. Inventory is easy—stock always visible. Fork truck delivers to assembly points.

Write today for free illustrated booklet to Pittsburgh Steel Products Company, 3257 Grant Building, Pittsburgh 30, Pa.

Cargotainer

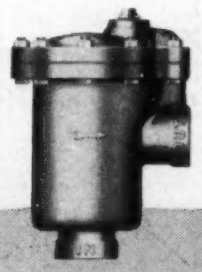
HIGH PRESSURE Problems?

change to TRANE "CLASS 200" Traps...



The Trane "CLASS 200" Float Trap

This rugged, dependable trap combines thermostatic and float action. Stainless steel float with variable ratio lever prevents wire drawing. Heat-treated silchrome seats and plungers promise long life. Brass shielded monel bellows protects against water hammer damage and adds to trap sensitivity. Body and cover castings are nickel iron. For pressures to 200 pounds.



The Trane Bucket Trap

This heavy-duty trap defeats wire drawing, since exclusive "snap action" keeps the trap either fully open or tightly closed. Entire trap mechanism lifts out with trap cover. No piping need be disconnected. No special tools are needed for disassembly. Seats and plungers are heat-treated silchrome. For pressures to 200 pounds.

TRANE

HEATING AND AIR CONDITIONING systems

Which Trap Shall I Use?

The Trane Company
La Crosse, Wisconsin
or Trane Company of Canada, Ltd., Toronto, Ontario

Please send me your booklet telling how to select the right trap for the job.

Name.....Title.....

Address.....

City.....Zone....State.....

supplies refrigeration to one of the conditioners, a 10-hp. evaporative-type unit operates the other. Twin condensers of the water-cooled finned type are mounted on a structural steel base. Series-type flow condenser head and an automatic water valve are supplied for city water application; parallel flow heads are available for use with a cooling tower. Frigidaire Division, General Motors Corp., Dayton 1.

•

High-Tiering Pallet Rack

Multi-purpose pallet and rack combination, called Uni-Raks, consists of four standposts, which slide under the pallet. When stacked, the corner pieces on the top of the rods separate loaded pallets to prevent crushing, and permit tiering of sacks, packages, and odd-shaped products for storage. They fit all standard pallets up to 48x54 inches, and may be tiered for a total load up to 4000 pounds. Material Handling Equipment Co., 30 Church St., New York 7.

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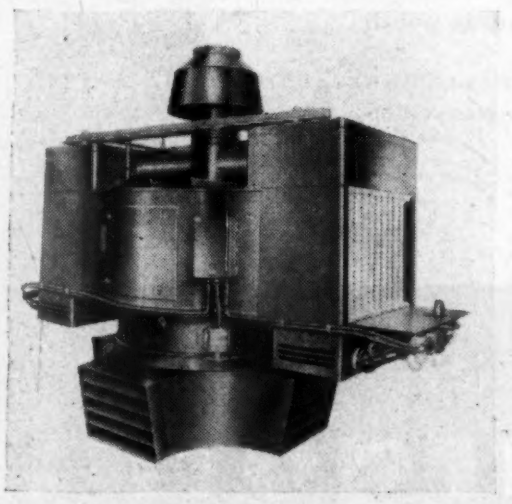

Gas-Fired Unit Heater

Self-contained gas-fired revolving unit heater uses either natural or manufactured gas. It combines gas burners, heat exchanger, and combustion chamber with a motor-driven fan and revolving discharge outlet;

FOR SAFETY PLUS

For *better* rubberized Work Gloves, look for the HOOD Trade Mark — a sign of quality since 1896. Styles to suit every requirement. Send for folder. Order from your jobber.

HOOD

HOOD RUBBER CO., WATERTOWN, MASS.
A Division of the B. F. Goodrich Company

New Life FOR YOUR CEMENT FLOORS!

COLOROCK

Ideal for cement surfaces, this long-lasting floor finish is also correct for magnesite or wood flooring—wherever an OPAQUE, COLORED finish is desired. Being OPAQUE, it hides wear and discoloration. One of these three standard colors, light gray, dark gray or maroon, will lend itself to your floor decorating plan.

COLOROCK comes in liquid form, ready-mixed, *ready to apply*. Impervious to grease . . . stands up well under vehicular as well as pedestrian travel. Let COLOROCK give your floor new life with its brand-new look!

The booklet "Floor Maintenance" contains the answer to your specific floor-finish problem. Write for your copy today.

THE C. B. DOLGE CO.
WESTPORT, CONNECTICUT

"He's figuring what we *SAVE* by using N-B-M #397 SILVER BABBITT!"

First he figured the performance based on service records of bearing-lining metals and then he figured the first-costs... N-B-M #397 Silver Babbitt won on both counts.

If you're responsible for cutting costs in your plant or product, find out about N-B-M #397 Silver Babbitt. This comparatively recent development has already been accepted as standard procedure by engineers interested in long, trouble-free bearing service combined with lower costs. N-B-M Silver Babbitt gives you all the desirable performance of tin-base babbitt *at considerably less cost.* Note these economy and performance characteristics of N-B-M Silver Babbitt:

- Retains hardness at higher temperatures
- Easy to bond
- Has high corrosion-resistance
- Embeds dirt and grit, even at room temperature
- Costs 30% to 40% less than tin-base babbitt

Plant Operating Engineers and Product Designers: Write for N-B-M Silver Babbitt Folder containing physical properties and Engineering Briefs. Quotations on request.

N-B-M... Serving Industry With Better Products... Better Service

Plants in: St. Louis, Mo. • Meadville, Pa. • Niles, Ohio • Portsmouth, Va. • St. Paul, Minn. • Chicago, Ill.

AMERICAN Brake Shoe COMPANY

NATIONAL BEARING DIVISION

4930 Manchester Avenue • St. Louis 10, Mo.

TOP OPERATING EFFICIENCY

FOR at Reduced Maintenance Cost

PRODUCT IMPROVEMENT...

PLANT ENGINEERS RECOMMEND

Schmieg DUST AND FUME CONTROL EQUIPMENT

Below is shown a 14000 CPM Centri-Merge Arrester Unit on a cast iron dust exhaust system.

CYANIDE FURNACES fume exhaust system is connected to a Centri-Merge Washer.

To Fit Both Plant and Product

Dust and fume control equipment correctly designed and manufactured is of vital importance to the safety and health of plant personnel, and results in product improvement. Schmieg engineers pioneered this principle of dust and fume control.

Plant engineers call upon Schmieg to design and build dust and fume control equipment to fit both plant and product. Typical installations by Schmieg include dust and dirt arresters, fume exhaust air washers, kerosene and welding fume exhaust units, stock and dust handling equipment in textile plants, cyclone collectors for brake lining dust, polishing and buffing dust collectors... to name just a few.

Schmieg dust and fume control units give you (1) reduced operating and maintenance expense, and (2) maximum efficiency in the removal of dust and fumes for improvement of working conditions and product quality.

DISC SANDING BOOTH Proper ventilation keeps dust from escaping to other parts of plant.

THE best AIR PURGE is CENTRI-MERGE

Our engineers will be pleased to consult with you in the solution of your problem

Schmieg INDUSTRIES INC.

Engineers & Manufacturers

designed for overhead location, it projects the heated air to the working level, circulates the warmth in all directions, according to manufacturer. In the summer, units may be converted to cooling devices by turning off the gas and turning on the fans. L. J. Wing Mfg. Co., 154 West 14th St., New York.

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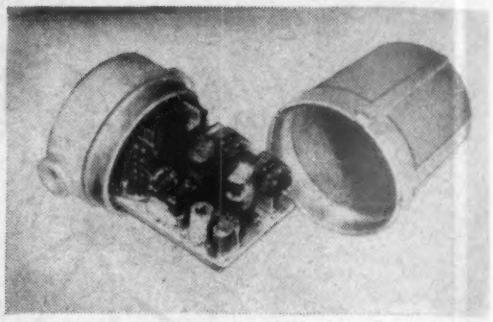

Load Control

Electronic load control, called Flex-I-Trol, for use with motor-operated processes such as pulverizers, pumps, extruders, and similar equipment, is said to maintain a constant motor load by regulating the input speed. Variable time delays and a variable dead zone are incorporated to eliminate hunting and assure operation at maximum output. Suitable for use with motors of all ratings, the control employs two identical radio-type vacuum tubes, and operates from 115 volts, 60 cycles. Equipment is available in either explosion-proof or standard sheet metal housing. G. C. Wilson & Co., 2 North Passaic Ave., Chatham, N. J.

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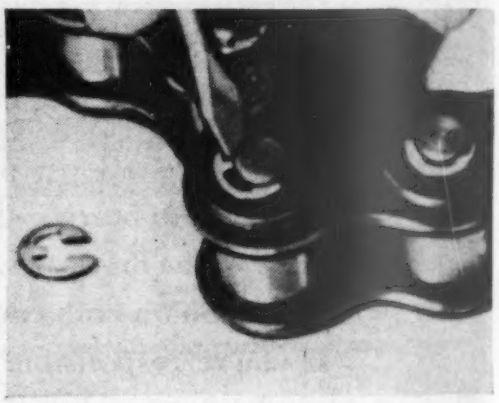

Roller Chain Fastener

Roller chain fastener, said to reduce shutdowns caused by roller chain shear, consists of a retaining ring provided with three internal, equally spaced teeth, sprung radially into a groove on the pin. Equal spacing of these teeth and the spring action of the connecting links are said to provide tight groove tension. If disassembly should be necessary, the recesses between the teeth make the ring sufficiently resilient to permit the necessary spread without giving the ring a permanent set, according to its maker, who states that disassembly can be accomplished with an ordinary screwdriver. Atlas Chain & Mfg. Co., Castor & Kensington Aves., Philadelphia 24.

•

Low Platform Truck

Designed for use in plants where heavy loads of materials or products having large surface areas must be

Bunting Bearing Bronze leads its field—and Bunting Distributors are the leaders in their territories. More than 1300 sizes of Bunting Bars, Stock Bearings and Electric Motor Bearings available from hundreds of Bunting Stock-Carrying Distributors. There is one near you and ready to serve you. Ask him for the Bunting Catalog. The Bunting Brass & Bronze Company, Toledo 9, Ohio.

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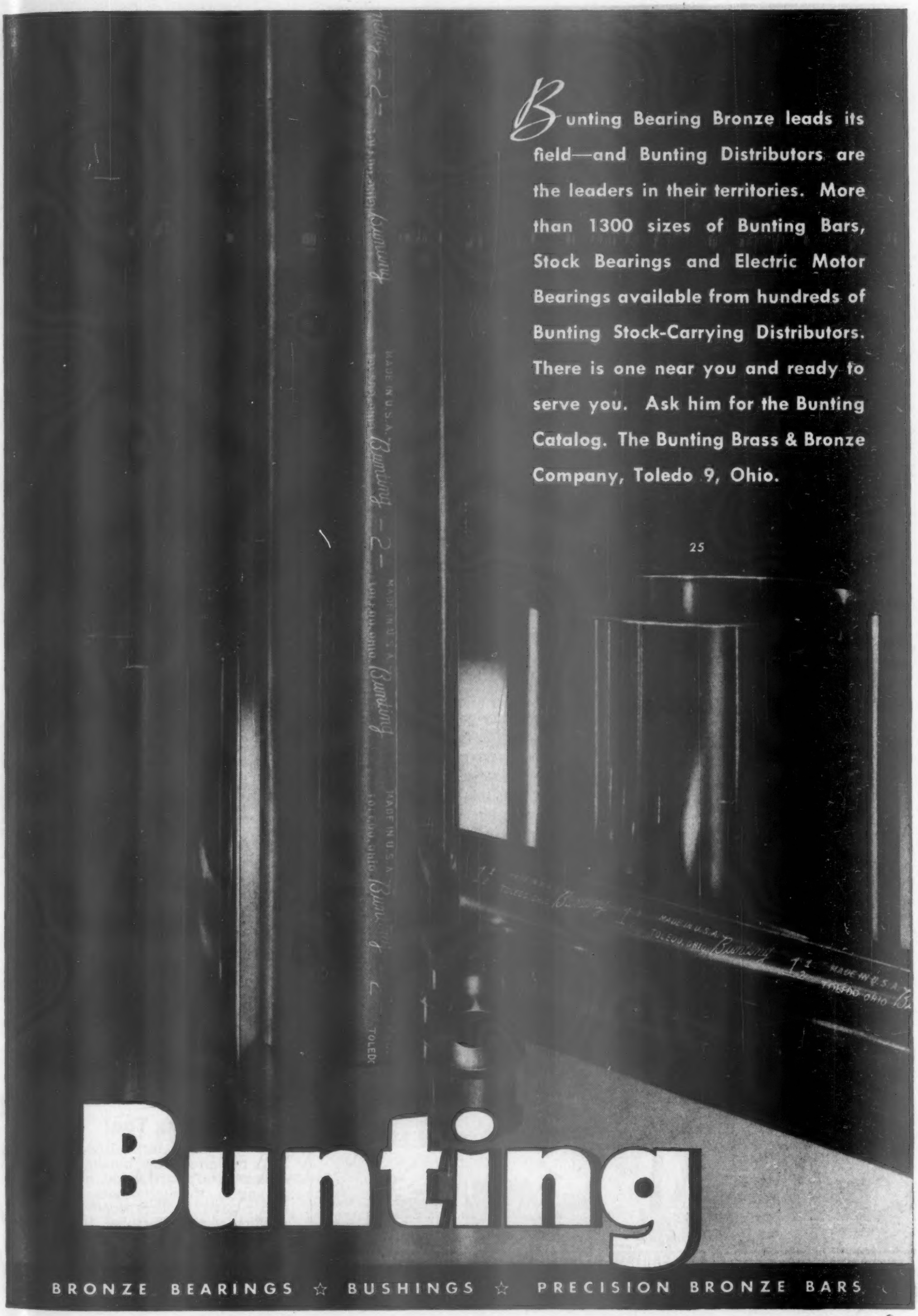

Bunting

BRONZE BEARINGS ☆ BUSHINGS ☆ PRECISION BRONZE BARS

MATERIAL HANDLING *News*

a BIGGER exhibit of BETTER machines TO DO MORE WORK AT LOWER COST

—the Third National Materials Handling Exposition

The 1949 Exposition will be held in Philadelphia January 10 through 14 and will constitute a broad view and preview of "industrial history in the making." It will be the most convincing demonstration of all time that the Science of Materials Handling is eternally new—that it is a never-ending process of evolving new and better methods and equipment to the end that our National economy can shake off the shackles of old, inefficient and time-consuming practices which have become prohibitively costly both in human energy and in dollars.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIV., CLARK EQUIPMENT COMPANY BATTLE CREEK 12, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

transported close to floor levels, placed on skids, or supported on frames mounted on skids, low-lift platform power truck is 12 feet long, 32 inches wide, weighs 8000 pounds. Its load-carrying capacity is 20,000 pounds. Top of platform in lowered position is 11½ inches above floor level; maximum height elevated, 17 inches. Platform is raised by hand-lever control of two hydraulic cylinders. Hydraulic-power steering mechanism permits the truck to be turned in 99½-in. aisle intersections. The truck is either all-electric or gas-electric powered. The Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 14.

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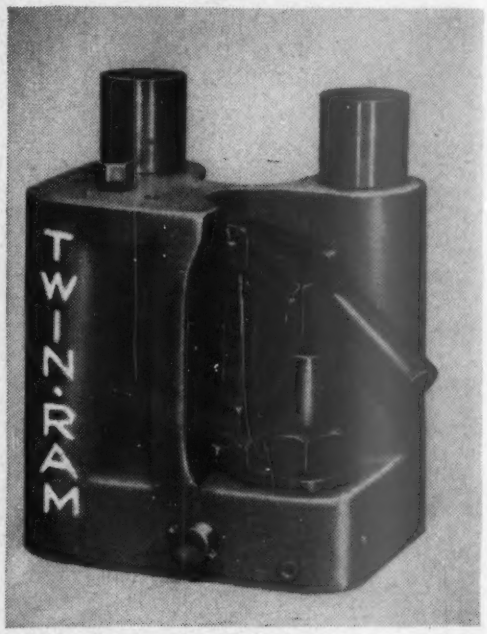

Hydraulic Puller

Twin ram hydraulic puller, No. 501, is a self-contained, self-lubricated unit. One-piece valve is said to eliminate packing glands. May be used to lift, pull, or push, and can be used as a press or straightening bar. Available in 30-, 60-, 80-, and 100-ton sizes. Livingston Mfg. Co., 8438 Otis St., South Gate, Calif.

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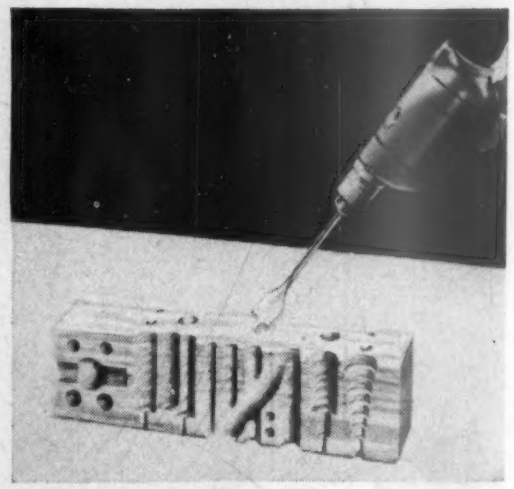

Wood Boring Tool

Flat type wood bit, called the Whiz-Bit, designed for boring holes in either soft or hard wood, can be used at angles, through knots, and without regard to the wood grain, according to manufacturer. It is a high-speed bit, for use with drill presses, portable electric or pneumatic drills. Long pilot on the bit starts the hole and maintains its diameter to close tolerances, claims its maker, who

The slot's the thing! The bottom of the durable steel duct casing is designed with a continuous slotted opening for convenient outlet availability.
Pictorial evidence of how easy it is to move or add lights by plugging into BullDog Universal Trol-E-Duct. BullDog manufactures Vacu-Break Safety Switches • SafToFuse Panelboards • Superba and Rocker Type Lighting Panels • Switchboards • Circuit Master Breakers • "Lo-X" Feeder BUStribution DUCT • "Plug-In" Type BUStribution DUCT • Universal Trol-E-Duct for flexible lighting • Industrial Trol-E-Duct for portable tools, cranes, hoists.

This slot always means a light overhead

IT'S EASY to provide for both present and future lighting requirements of your plant.

Sometime in the future your machines may have to be moved . . . an entire production line relocated . . . or your lighting set-up changed. With old-type wiring systems, this involves much time, expense and high overhead. This all can be avoided.

Every inch a tap-off

Lighten your overhead with BullDog Universal Trol-E-Duct, the completely flexible lighting system. Every inch of the continuous slot in bottom of Trol-E-Duct is a potential outlet ready to be tapped by inserting trolleys or twist-out plugs.

Once you install Universal Trol-E-Duct in your plant, expensive rewiring is eliminated, regardless of changes. The reason is this: Tap-off plugs or trolleys for lights or small tools can be moved to new locations at any time, and be reinserted in the continuous slot.

All parts are salvable

Prefabricated and standardized Universal Trol-E-Duct can be dismantled and reinstalled quickly anytime, without scrapping a single part. You can also expand an existing system simply by adding standard Universal Trol-E-Duct sections and fittings.

Learn more about this modern, efficient system from your nearby BullDog Field Engineer. He will be glad to show you a typical installation near your own plant. Or, write BullDog direct for descriptive literature.

BullDog's Field Engineers welcome the chance to sit in on planning stages of a building project. Their knowledge of electrical distribution layout can mean savings in installation and maintenance costs, as well as highest efficiency and reliability in actual operation. Why not take advantage of this pre-building service?

BULLDOG ELECTRIC PRODUCTS COMPANY
DETROIT 32, MICHIGAN—FIELD OFFICES IN ALL PRINCIPAL CITIES
IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO

BULLDOG

HEADQUARTERS FOR ELECTRICAL DISTRIBUTION

Simplification of Production and Cost Controls Saves for SUNBEAM

Sunbeam Corporation, Chicago, simplified control of production, costs and payroll through McCaskey "Visible-Filing and One-Writing" in 1921; has extended control several times with increase in facilities for manufacturing the "Shavemaster" and other Sunbeam electrical products.

McCaskey provides their central production office with visible control over all the work-in-process by piece part numbers and operations with a minimum of clerical overhead, according to Mr. John J. Kaser, Sunbeam Production Manager. Thousands of posting operations are saved, for example, by quickly filing copies of control tickets on McCaskey Planning Boards for this control.

The visualized tickets provide a progress record by operations (frequently as many as forty) that is available at a glance, as shown in the illustration above. They also constitute a complete record of work-in-process that is both accurate and up-to-date. Errors and delays seldom occur since the tickets are identical copies of certified original records.

Additional copies, made without additional writing, promptly provide the Payroll Department with data for computing incentive and non-productive earnings, the Cost Department with identical information for analyzing actual performance in comparison with standards, and Employees with a "receipt for pieces made" and a later verified record of earnings.

This one multi-copy ticket thus provides the data for complete production records and control and makes them available with a saving of thousands of hours of clerical work annually. Continued use of the McCaskey fundamentals of "One-Writing and Visible-Filing" for twenty-seven years indicates the flexibility of McCaskey Controls and their adaptability to rapidly expanding and changing requirements.

Write for a demonstration and suggestions for an application to your particular needs—or send for a copy of "The ABC's of Production Control" and other descriptive folders.

McCaskey INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCaskey Systems Ltd., Galt, Canada — The McCaskey Register Co., Watford, England

states that holes can be bored in any direction, at angles from 45 to 90 degrees, without preliminary chiseling, and to 4½-in. depth. Chips unload continuously, without removing the bit. Can also be used on Masonite, bakelite, plywood, fiber composition board, and similar materials. Available in sizes from ⅜ to 1⅛ inches. Intermediate sizes can be made by grinding or filing to the desired size, and blanks are available for making special profile tools. Rex Laboratories, 1717 Dent Ave., Indianapolis 2.

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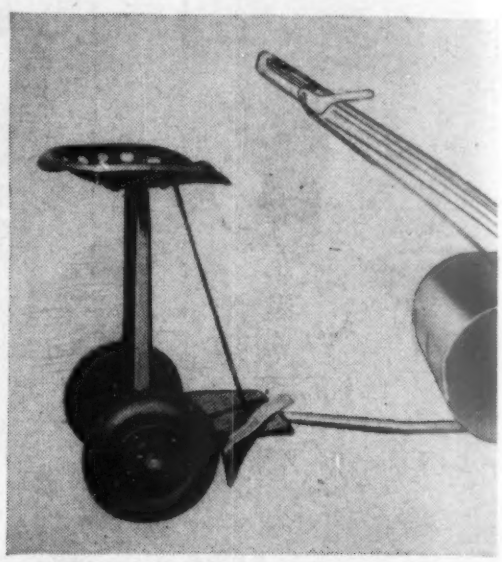

Towing Dolly

Sulky-type towing dolly, designed with hooks to fasten to power sweeper, is of steel construction and equipped with rubber-tired zero-pressure air wheels. Manufacturer states that it has a low center of gravity for stability. When it is attached to manufacturer's power sweeper, the complete unit has a turning radius of from 90 to 125 inches. Wilshire Power Sweeper Co., 4615 Alger St., Los Angeles 26.

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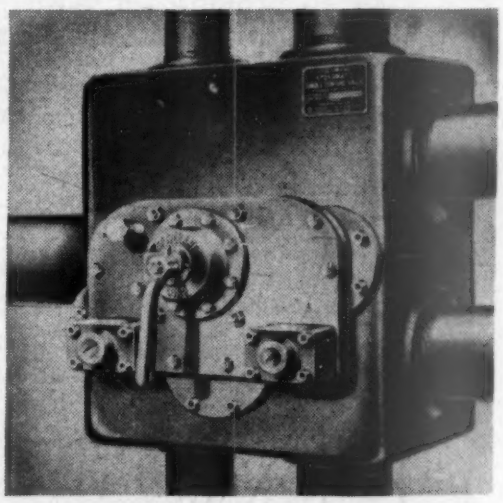


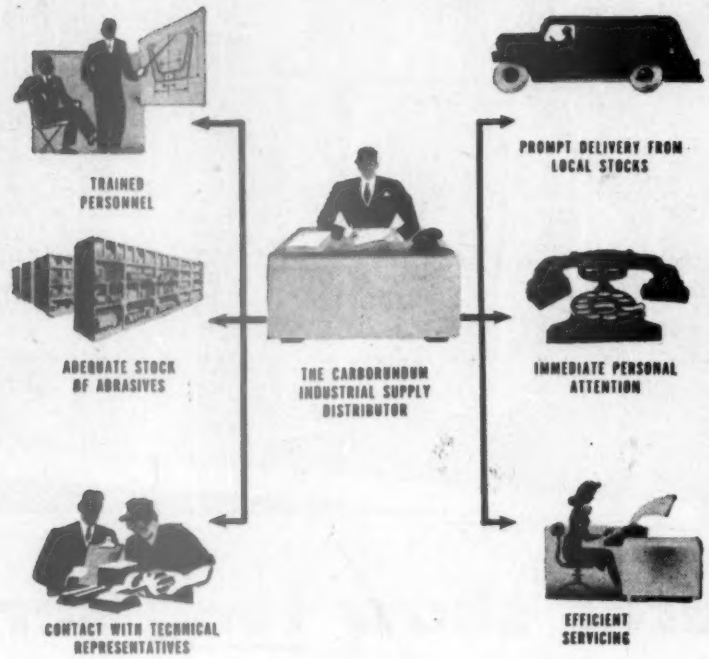
Hydromatic Control Valve

Hydromatic single control valve for the operation of zeolite softeners, ion exchange systems, and pressure filters, is said to simplify the control of backwash, rinse, service, chemical feed, and similar processes. A fixed-position valve, with four normal operating positions and two standby positions. In the control of zeolite systems, the four operating positions provide separate control of backwash, regenerant feed, rinse, and service, so that separate flow rates

A BUYING GUIDE FOR ABRASIVES

ABRASIVE PROBLEM:

Where is there a convenient Source of Supply?



ANSWER BY

CARBORUNDUM
TRADE MARK

As an efficient and dependable source of supply, the services and facilities of your CARBORUNDUM distributor offer time and money saving advantages.

From large and varied stocks of abrasives located conveniently nearby, the products you need are available without delay. Plant inventories can be safely and economically reduced.

Frequent personal service by a trained and experienced local staff provides reliable facts and figures on abrasive applications and operations.

On difficult or unusual jobs, direct assistance from CARBORUNDUM representatives is available.

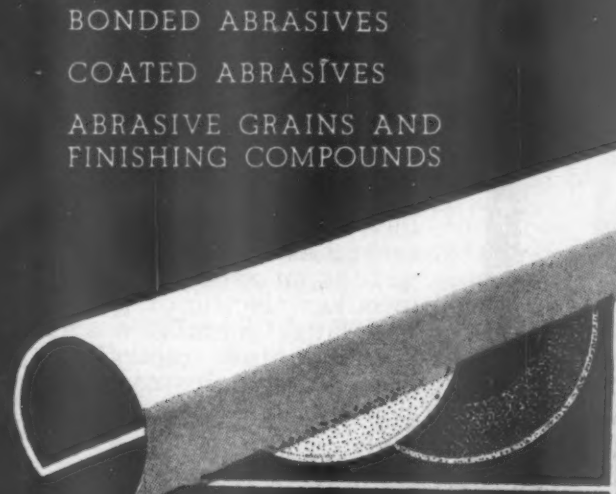
Simplified buying and other important savings realized from intelligent and efficient handling are creating an increasing preference for abrasives by CARBORUNDUM. The Carborundum Company, Niagara Falls, New York.

CARBORUNDUM
TRADE MARK

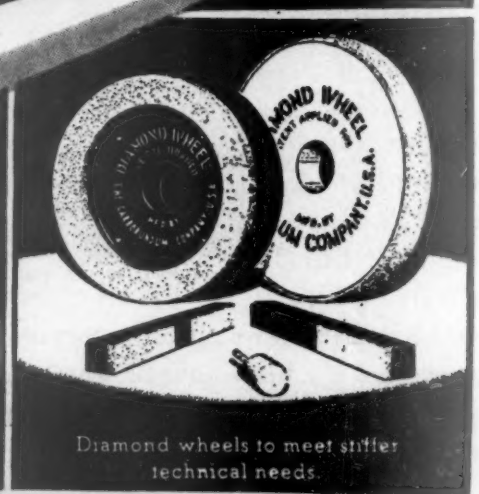
BONDED ABRASIVES

COATED ABRASIVES

ABRASIVE GRAINS AND FINISHING COMPOUNDS

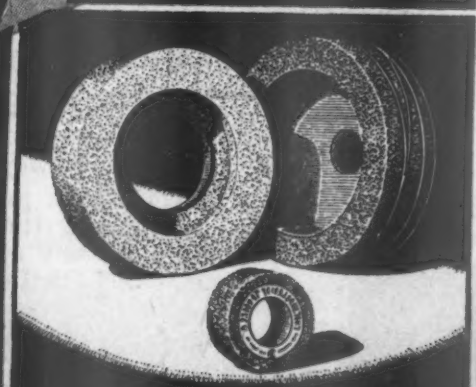


Specialized wheels by CARBORUNDUM for thread grinding

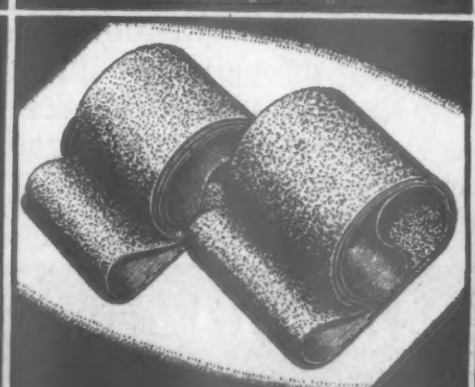


Diamond wheels to meet stiffer technical needs.

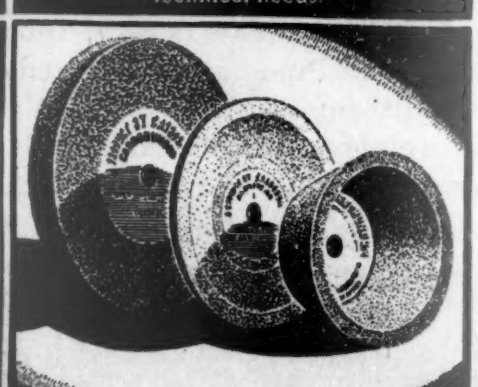
"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company



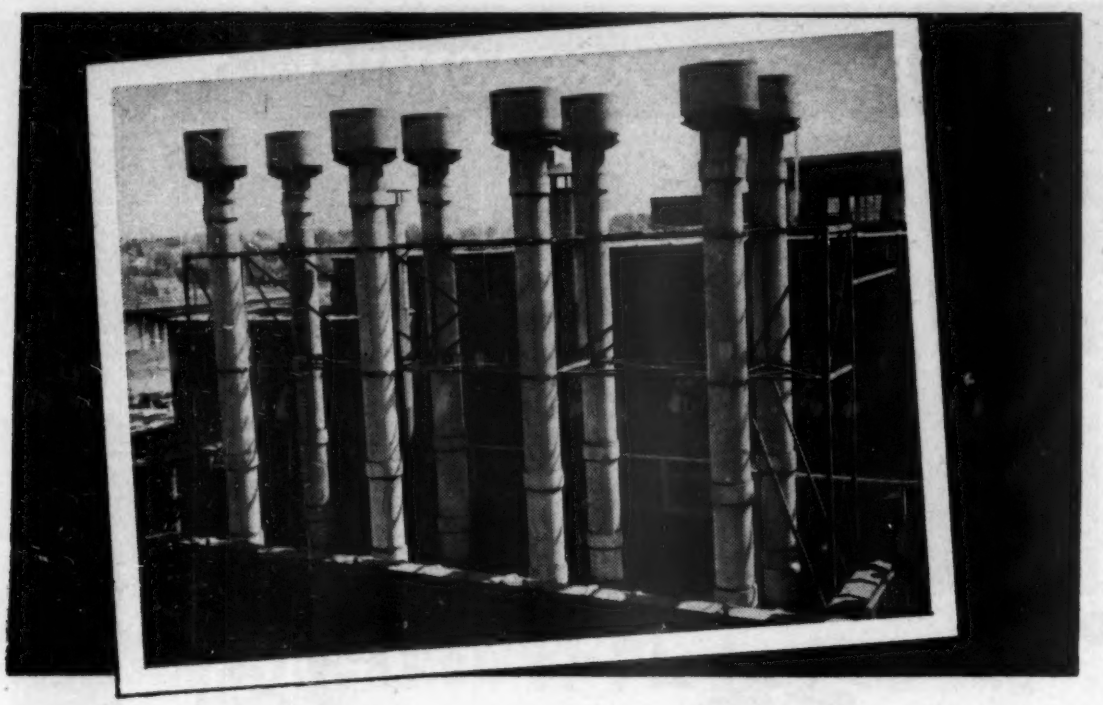
Cool cutting GREEN GRIT wheels for cemented carbide



A coated abrasive for every sanding and finishing condition



All standard shapes are supplied in grinding wheels by CARBORUNDUM



Records show long service in tough service . . . for Transite Industrial Vent Pipe

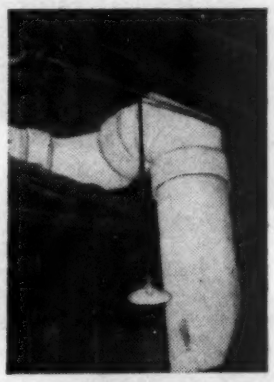
In installations in many industries where corrosive fumes, vapors, dusts, and gases are encountered, Transite Industrial Vent Pipe is yearly demonstrating the fact that it is a practical, economical answer to tough venting problems.

Workable: Transite can be cut and drilled on the job.

Because it is an asbestos-cement product, this strong, durable pipe stands up in many types of corrosive service . . . helps avoid costly replacement . . . results in important reductions in plant maintenance.

Easily installed—Transite Industrial Vent Pipe has many practical installation advantages. It is light in weight and easily handled. It is readily worked and can be quickly cut and drilled on the job with ordinary tools.

Easily adapted—Made in a range of sizes up to 36" in diameter, Transite Industrial Vent Pipe is readily adapted to use as vents, ducts, and stacks. A full line of Transite fittings provides a venting system that is corrosion resistant throughout.



Adaptable: A complete line of Transite fittings meets most job requirements.

Economical to maintain—Transite is completely rustproof...highly weather resistant . . . needs no painting . . . resists corrosion outside, inside and all the way through. For full details about Transite Industrial Vent Pipe, write Johns-Manville, Box 290, New York 16, N. Y.

JM PRODUCTS

Johns-Manville TRANSITE Industrial Vent PIPE

may be assigned to each operation. Two standby positions provided; in one, container being serviced is isolated from service lines; in the second, container may be drained to bed level for inspection. Operation may be either automatic or manual. Cochrane Corp., 17th St. & Allegheny Ave., Philadelphia 32.

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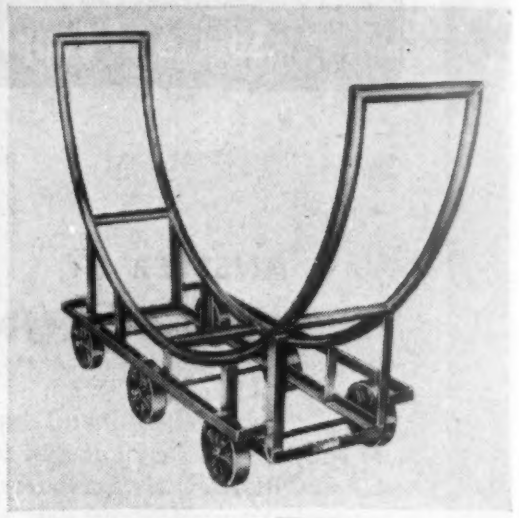

Roll Truck

Heavy-duty roll-handling truck is adapted to handle products with comparatively small diameters and lengths not exceeding 5 feet. Manufacturer states that the 6-ft.-dia. body keeps the load centered so that it will not roll off, regardless of the number of pieces stacked. Fabricated from steel pipe, all welded, and equipped with 8-in. semi-steel or rubber-tired wheels. Ironbound Box & Lumber Co., 47 Hoffman Place, Hillside, N. J.

•

Combination Temperature, Humidity Control

Designed to control both temperature and humidity in plants where specific atmospheric conditions must be maintained, combination temperature and humidity control also includes a filter system to protect the measuring and controlling elements from lint and dust. One locked cabinet contains the controlling, indicating, and filtering mechanisms, as well as an aspirating fan. Available in either electric or pneumatic type. The latter contains a series of five flush-mounted recording pressure gages. Brown Instrument Co., Division of Minneapolis-Honeywell Regulator Co., 2709 Fourth Ave. South, Minneapolis 8.

•

Shock-Resistant Hydraulic Gage

Hydraulic dial gage, known as "Hydrodial," employs an adaptation of the direct action principle which is said to permit the elimination of delicate parts and result in construction capable of withstanding surging and pounding hydraulic pressures. Device is made in nine pressure ranges, the lowest of which is 5-50 pounds, and the maximum 500-5000 pounds. Dial face is white shatterproof plastic, numerals are black and crystal. Calibrations are large enough

WRIGHT

"OVERHEAD"

The new WRIGHT *Speedway* electric hoist is built with 1948's high speed production in mind. It is not "just another" electric hoist. It has features that save many man-hours—in operation and in maintenance.

Check the *extras* in the new WRIGHT *Speedway*. Compare the *Speedway* with any other electric hoist on the market. Only here will you find all these advantages:

- **. . . Cable drum grooved to prevent overwinding**
- **. . . Swaged fittings on preformed wire rope guaranteed to hold beyond 100 per cent breaking strength of the rope**
- **. . . Motors interchangeable as to capacity or speed—or both**
- **. . . Push-button control with messenger chain to take load off cable when used as tow line**
- **. . . Heat treated and hardened gears**

. . . and many others. From ¼ to 1 ton capacities. Write us, York, Pa., for illustrated folder DH-1250. See your WRIGHT distributor for a complete line of overhead traveling cranes and chain hoists.

ACCO York, Pa., Chicago, Denver, Los Angeles, San Francisco, Portland, New York, Bridgeport, Conn.

WRIGHT HOIST DIVISION
AMERICAN CHAIN & CABLE

HOISTS TROLLEYS CRANES

TRADE MARK

In Business for Your Safety

"Automatic" Sprinklers . . . A Vital Business Economy for Industry the World Over

ARE you in a position to definitely measure the over-all cost of destruction, should fire reduce your plant or property to a shambles of twisted steel or broken concrete? We doubt it, for fire loss represents considerably more than is visible in the destruction of buildings, equipment and records. It means the interruption of production and service, the reduction of assets and increased liabilities. It means temporary and perhaps permanent loss of customers. In short, it could well mean the financial ruin of your entire business enterprise.

On the brighter side of this picture of fire destruction stand "Automatic" Sprinklers, industry's most effective weapon against fire. For, "Automatic" Sprinkler systems are supersensitive to the very indication of flame. They make the fire extinguish itself, even before it can make headway. And, on the financial side, "Automatic" Sprinklers, like any other capital asset, can be amortized over a given period of years, with their initial cost ultimately taken as an operating expense.

You and every other executive with an appreciation of business economy must not overlook the importance of fire safety with "Automatic" Sprinklers, *an important investment today . . . perhaps welcomed protection tomorrow.*

"Automatic" Sprinkler

FIRST IN FIRE PROTECTION

DEVELOPMENT • ENGINEERING MANUFACTURE • INSTALLATION

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA

YOUNGSTOWN 1, OHIO

OFFICES IN PRINCIPAL CITIES OF NORTH and SOUTH AMERICA

to be read at a distance of 50 feet. A. Schrader's Son Div., Scovill Mfg. Co., Inc., 470 Vanderbilt Ave., Brooklyn 17, N. Y.

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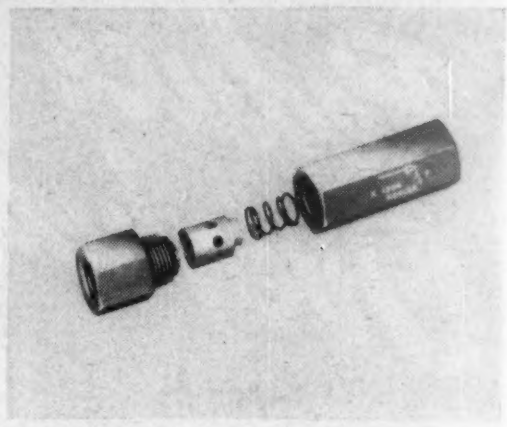


Check Valve

Check valve, K-1354, is small, light in weight, and said to be leakproof at low as well as high pressures. Can be used on air, oil, gas, water, and other fluid power lines, with operating pressures up to 100, 500, 1000, 1500, or 3000 p.s.i., as required. Opening may be specified between 0 and 100 p.s.i., to meet requirements. Valves are proof-tested at 7500 p.s.i., and have a temperature range of -65 to +160 deg. F. Available in 1-, ¾,- ⅝-, ½-, ⅜-, ¼-, and ⅛-in. sizes, with internal pipe, external pipe, or tubing connection, in aluminum, brass, stainless steel, or monel metal. Kohler Co., Kohler, Wis.

•

High-Pressure Cleaner

Developed for cleaning processing equipment, machinery, and other equipment, portable Hi-Pressure Jet Cleaner removes residues, dirt, and similar matter. Unit has a self-contained 50-gal. tank for a detergent, a 50-ft. pressure-type hose and nozzle with operating controls for various cleaning jobs. Connected to a steam and water line, high-pressure and high-temperature water shoots from the nozzle. If desired, the jet can be uniformly mixed with a specific amount of detergent. Presssure is adjustable. Sellers Injector Corp., 1605 Hamilton St., Philadelphia 30.

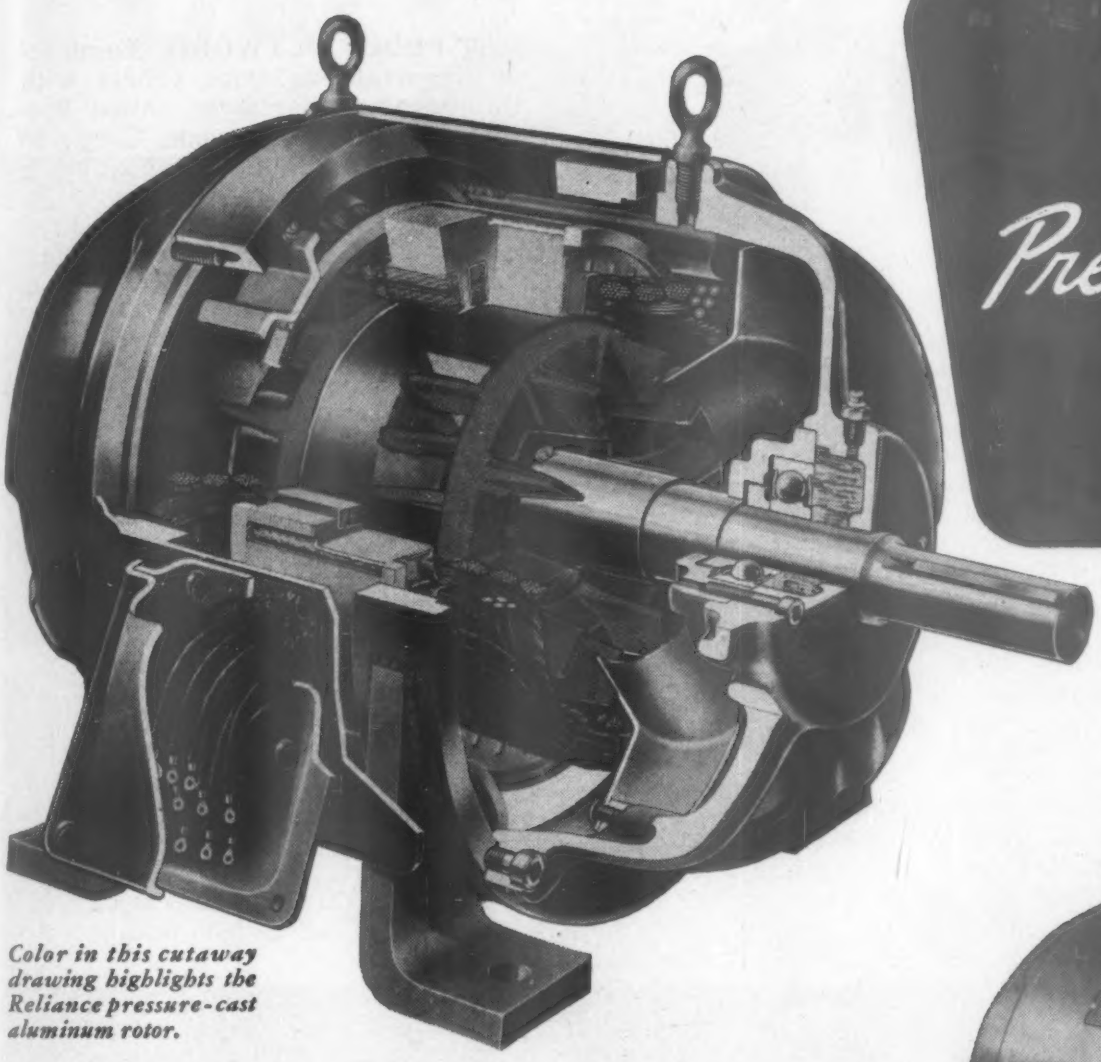
•

Current Transformers

Designed to increase the current ranges of instruments requiring compensated transformers, Model 313 "Donut" type transformers are of the insert primary type, compensated for phase angle and ratio error. Although designed for 5-va. capacity, manufacturer states that the turns ratio is low enough to eliminate danger of high open circuit secondary voltages. Insulated for 2500 volts a.c.; can be used on 25 to 133 cycles. Available in ratios from 25/5 to 1000/5 amps., and in multi-range combinations with single primary and tapped secondaries to provide several ranges without circuit changes. May be connected directly, or through switching arrangements where several transformers are to be used with one instrument. Associated Research, Inc., 231 South Green St., Chicago 7.

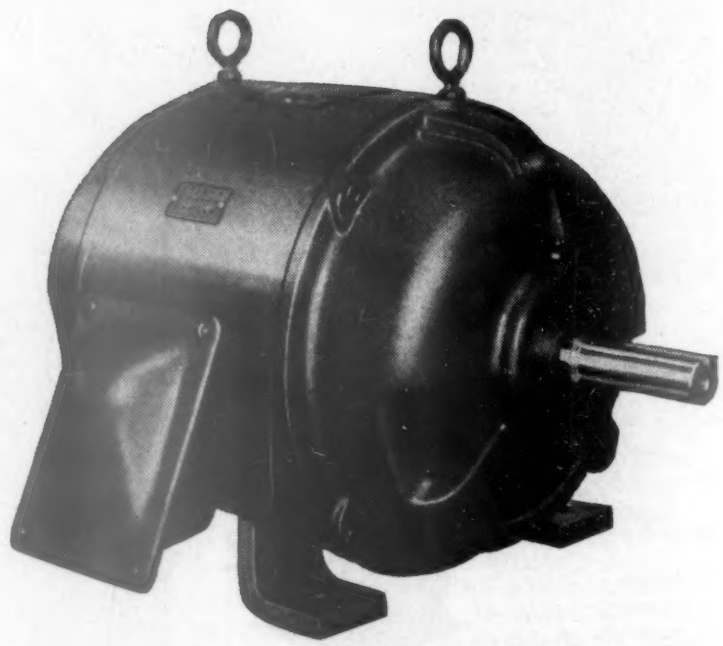
INDESTRUCTIBLE . . .

PRESSURE-CAST ALUMINUM ROTORS



Color in this cutaway drawing highlights the Reliance pressure-cast aluminum rotor.

Precision-Built



Reliance Protected Open A-c. Motor.

One of the many outstanding features that make Reliance *Precision-Built* Motors your best choice for dependable, long-lasting power is an indestructible rotor, pressure-cast in aluminum. This construction makes rotor bars, short circuiting rings and fan blades an integral section for rugged service requirements. Rotor cores of electric silicon steel are precision punched for greatest efficiency and the slots are skewed to provide quiet operation and uniform starting torque. For further facts on what *precision* means in Reliance *Precision-Built* Motors, write for Bulletin C-118.

Sales Representatives ***in Principal Cities***

RELIANCE ELECTRIC AND ENGINEERING CO.

1070 IVANHOE ROAD • CLEVELAND 10, OHIO

"Motor-Drive is More Than Power"

106 cost-saving ways to use electronics

Down-to-earth course trains your personnel to apply them in your plant

To get the most out of electronic equipment, your personnel must thoroughly understand its fundamentals, advantages, and limitations. To help you with this training problem, General Electric has prepared a complete, easy-to-take visual course in industrial electronics.

Here's what the G-E electronics training course offers—

1. A 146-page instructor's manual, designed to give your employees a *practical* understanding of the fundamentals of electronics...tell them how they're applied in modern industry. It enables a member of your organization to conduct the 12-lesson course.

2. Twelve Slidefilm Lessons each with its own record. The lessons are phrased in non-technical language ...devoted to *specific applications.*

3. Twelve Review Booklets, illustrated, for reference and home study.

Free inspection offer—

Once you've seen the scope of this fact-packed course, we know you'll be convinced it will pay off for you. So, examine the instructor's manual *without obligation.* After you've seen it, you will want to order the complete course which is offered at cost... only $120.00.

FREE TO BUSINESS MANAGEMENT

Attach to your business letterhead

General Electric Co.
Section B684-5
Schenectady 5, N. Y.

Please send me a sample copy of the G-E *Industrial Electronics Training Course Manual* (GES-3330) without cost or obligation.

Name _____ Title _____

Company _____

Street _____

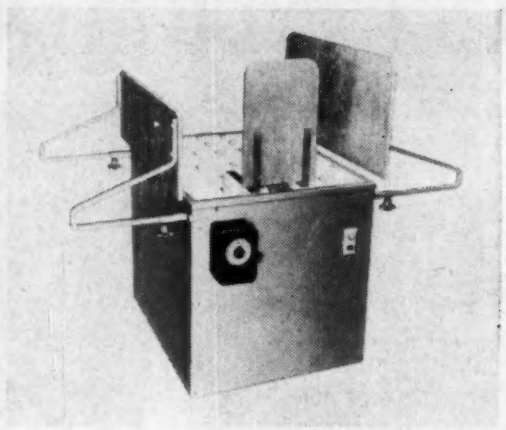
City _____

GENERAL ELECTRIC

YOU WANT TO KNOW

more about the items on this page

Letters to the addresses given will bring you further information.



COUNTER, STACKER handles flat objects. Counts up to 200 pieces per minute. Stacks them, transfers counted pile to conveyor. Handles pieces 9 to 82 inches wide. Superior Punch Press Company, 3610 Superior Avenue, Cleveland

COLOR ANALYZER. Electronic device said to detect color differences too small to be seen by human eye. For use on textiles, paints, dyes, similar products. Ansco Div., General Aniline & Film Corporation, Binghamton, N. Y.

SAFETY BOOKLET. "Butch Looks to You," 18 pages. Suggestions to supervisors on safety problems. Bul. 97, U. S. Department of Labor, Washington, D. C.

MANUAL, "When the Watchman Takes Over," 12 pages, illustrated. Qualifications, instructions, procedures for plant watchmen. Factory Insurance Association, Dept. of Information, 555 Asylum St., Hartford 2, Conn.

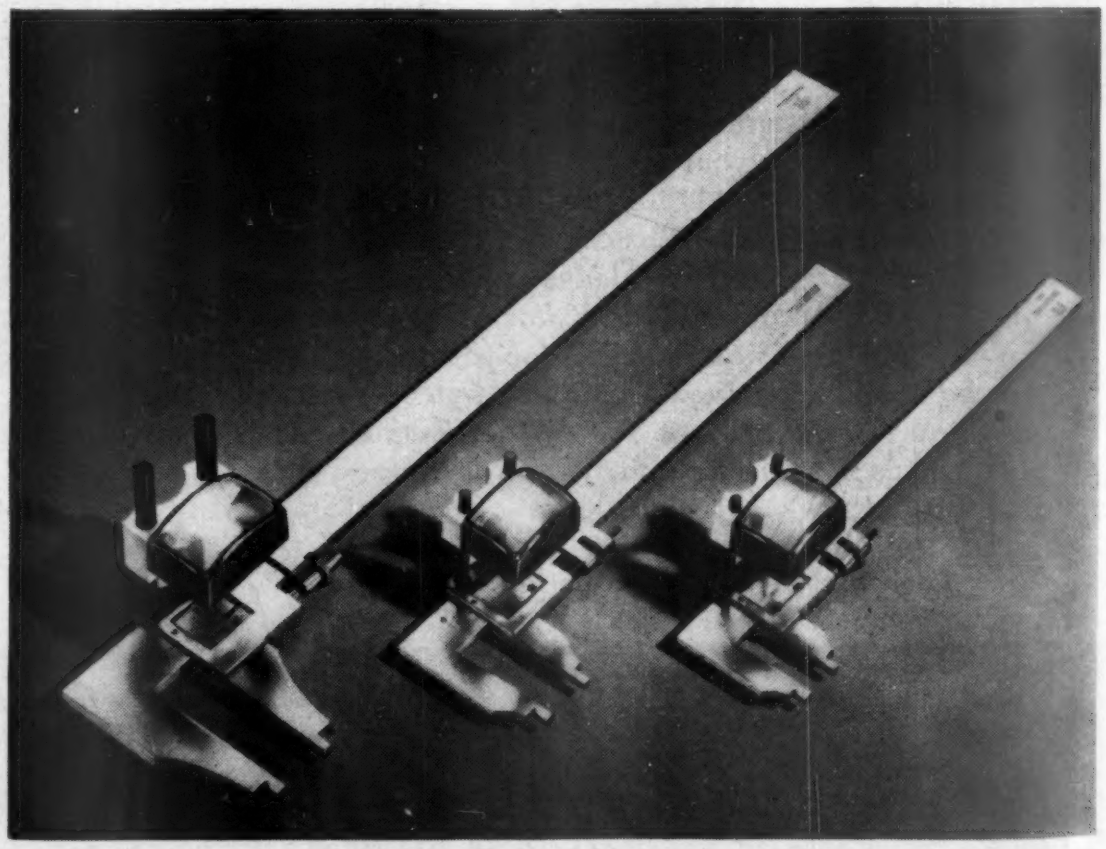
RAT-PROOF PLYWOOD. Laminated board of hardwood veneer with impregnated fiber faces, called Protekwood. U. S. Plywood Corp., 55 West 44th St., New York.

ALLOY STEEL. Hy-Tuf, said to combine degrees of toughness and hardness never before achieved in steel products. The Crucible Steel Co. of America, 405 Lexington Ave., New York.

STEEL PRODUCTION MAP shows geographical distribution of steel producing plants throughout U. S. Identifies companies by ownership, location, capacity, type of furnace. Office of Domestic Commerce, ODC-112 Commerce Department, Washington, D. C.

BOOKLET. "The World's Best Investment," 12 pages. Case histories and specific formulas used by companies in machine tool replacement programs. National Machine Tool Builders' Association, Cleveland.

PROTECTIVE COATING for aluminum. Chemical, called Alodine, sur-



MAGNIFIERS for Vernier scales on calipers and height gages. Precision ground lenses are of 3½ to 4 power. Spring brass and aluminum construction. Leatherette case furnished. Stebar Co., 711 West Lake St., Minneapolis 8

ALLIS-CHALMERS

"Certified" Service

A BREAKDOWN on this 39-year-old Allis-Chalmers fan motor crippled operations at the plant of an important midwest electric utility. Immediate repair was vital. The Chief Engineer called the nearest Allis-Chalmers Certified Service shop. They picked up the rotor and returned it ready for service in less than twenty-four hours.

This is the kind of emergency cooperation you can expect from every Allis-Chalmers Certified Service shop. On everyday repairs and maintenance too, your Allis-Chalmers Certified Service shop will give you prompt service on Allis-Chalmers motors, pumps and transformers, using factory approved methods and parts. Every Allis-Chalmers Certified Service shop has been selected for skilled, personal, careful workmanship, adequate equipment and *service mindedness.*

HOW TO FIND NEAREST SERVICE SHOP

Allis-Chalmers Certified Service shops are located in major industrial centers throughout the country. New shops are being appointed continuously and most smaller centers will soon be covered. To find the shop nearest you, call your closest Allis-Chalmers District Office. A 2543

MOTOR DELIVERIES GREATLY IMPROVED

Many types of Allis-Chalmers Motors are now in stock! Many other types are available on short delivery! For motors from 1 to 200 HP, check your nearest Allis-Chalmers Authorized Dealer. For motors larger than 200 HP, check with the nearest District Office. You may be able to get what you need sooner than you think.

ALLIS-CHALMERS, 1078A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

Pioneers in Power and Electrical Equipment from Generation through Utilization

Don't be a passive Firebug

● We don't have to describe the *active* firebug. Everybody knows of this maniacal type. Everybody is eager to detect him, to get him put away.

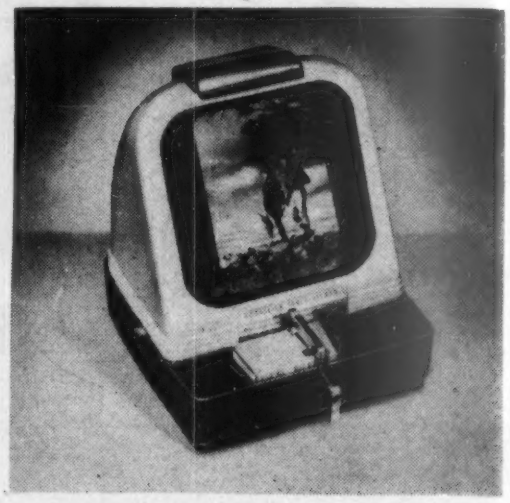
There is the calm, disregardless type, too. The man responsible for protecting premises against fires, but who feels... despite highest fire losses in history... his property will stay immune.

How about you? Is every vulnerable spot protected by the right type of fire extinguisher? Approved protective practice calls for no point to be farther than 50 UNOBSTRUCTED feet from a dependable extinguisher. Now is the time to double check your fire-fighting equipment.

There is a size and type of Buffalo *better-built* Fire Extinguisher exactly suited to every class of fire hazard. There probably is a thoroughly trained Buffalo representative in your locality who will be glad to assist you in checking your Fire-fighting equipment. If he is not listed in your classified telephone directory, please write us direct.

BUFFALO FIRE APPLIANCE
CORPORATION
DAYTON 1, OHIO

face coating, anchors paint, resists corrosion. Applied by dipping, spraying, brushing. American Chemical Paint Co., 3665 Palmer Ave., Detroit.



SLIDE VIEWER projects enlarged images of 2x2 in. slides on built-in screen. Portable table model can be used in fully lighted room for visual education. Eastman Kodak Co., Rochester 4, N. Y.

MICROFILM RECORDER copies both sides of document simultaneously. Two images are placed side by side on film. Has automatic feeder. Bell & Howell Co., 7100 McCormick Rd., Chicago.

STEEL DRUM LINERS for open-head, returnable type drums. Liners are disposable after use. For liquid or bulk use. Cincinnati Industries, Inc., Cincinnati (Lockland).

CALCULATOR. Adds or subtracts fractions. Converts fractions to decimals and *vice versa*. Circular type, 4½ inches in diameter. Wendt-Sonis Co., Hannibal, Mo.

STANDARDS INDEX. Summarized descriptions of NEMA Standards publications. Part I covers those printed or mimeographed, available in bound copies; Part II, mimeographed sheets, may be bound later. National Electrical Manufacturers Association, 155 East 44th St., New York 17.

LETTERS AND NUMBERS for making signs. Die-cut forms have pressure-sensitive adhesive on back. Used as stencil or applied directly for temporary sign. Can be used with or without paint. Wiggens Airways, Norwood, Mass.

SELF-LOCKING NUT. Two sizes, 5/16 and ¼ inch. Exerts pressure on threads to withstand vibration, no washers needed. Tinnerman Products, Inc., 2064 Fulton Rd., Cleveland 13.

SPECIFICATIONS. National Directory of Commodity Specification briefs catalogs, indexes information needed in buying all types of products; 1945 Directory with 1947 Sup-

HYPOWER HORIZONTAL ENCLOSED WORM GEAR DRIVE

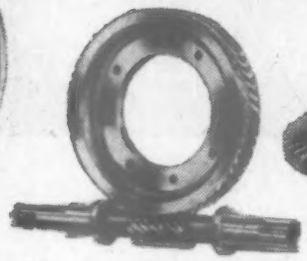
HYGRADE HORIZONTAL ENCLOSED WORM GEAR DRIVE

HYPOWER VERTICAL ENCLOSED WORM GEAR DRIVE

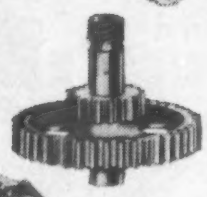
HYTOP VERTICAL ENCLOSED WORM GEAR DRIVE

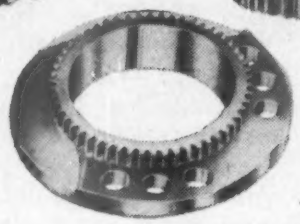
MAXI-POWER ENCLOSED HELICAL GEAR DRIVE

SPUR AND HELICAL GEARS



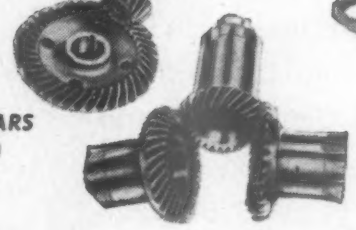
WORM AND BEVEL GEARS





"A-Q" GEARS (Aircraft Quality)

ACTUATORS



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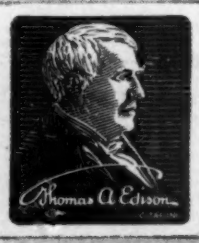

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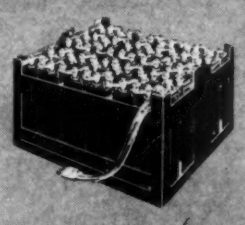

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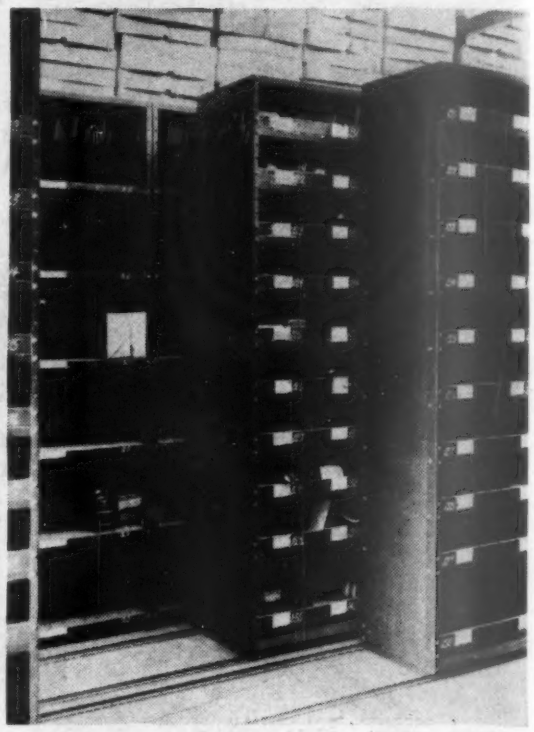

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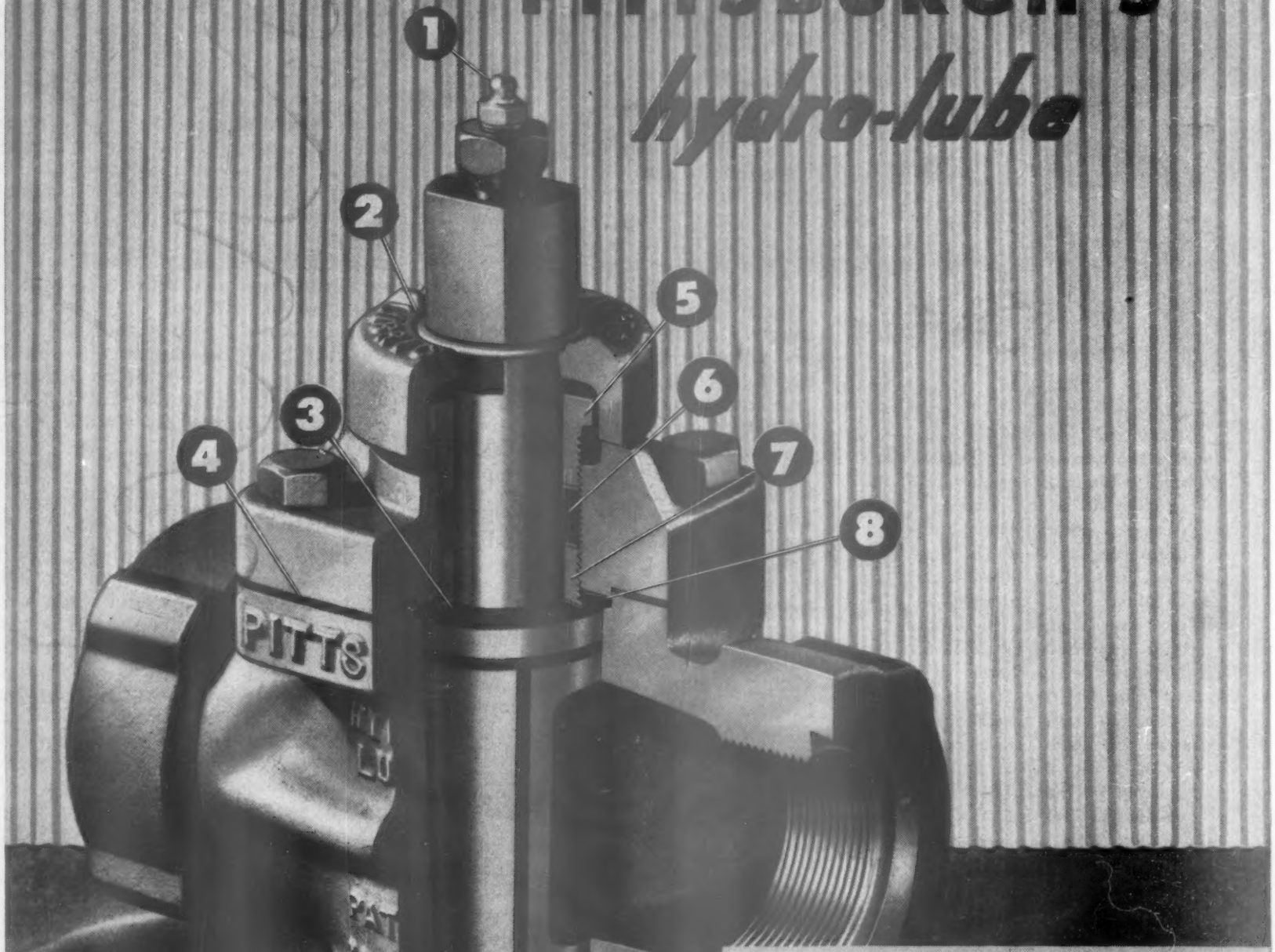

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SIGNIFICANT LABOR DEVELOPMENTS

BENJAMIN WERNE, Adjunct Professor of Industrial Relations, New York University and a Member of the New York Bar

Period Surveyed: October 1 to November 1

Trend Indicators

Wage-Hour

NOT GOOD FAITH DEFENSE

The fact that the employer accepted the wage-and-hour inspector's classification of guard sergeants as executives not entitled to overtime compensation does not constitute an "administrative approval" within the meaning of Section 9 of the Act. The acquiescence of the inspector cannot be considered an "administrative regular order, ruling, approval, or interpretation," since the issuance of an administrative regulation is a function of the head of the agency. "An employer to come within the protection of an administrative approval of interpretation must have followed the familiar routine of submitting a particular problem to the head of the agency for a ruling or opinion." (Bauler v. Pressed Steel Car Company, USDC N. Ill.)

OVERTIME AGREEMENT VALID

A contract entered into between an employer and his employees providing a fixed hourly wage for employees and guaranteeing employees a certain number of hours each week and which further provided that if employees were unable to work because of conditions beyond the control of the employer, they were to be credited with the full number of hours guaranteed and to be paid accordingly, was held to be a valid contract. The court in holding that such an agreement was not in violation of the overtime pay section of the Act said, "It was not the intention of the Congress to put employers out of business, nor was it the intention of Congress to deprive employees of work." (McComb v. Kirven & Son, USDC E. S.C.)

SALARIED EMPLOYEE MAY BE PAID HOURLY RATE

Although the contract provided for specified salary ranges for listed classification, an employer was entitled to place salaried employees on a curtailed work schedule during the strike and pay them an hourly rate in proportion to a monthly salary for the time actually worked. The union contended that the placing of salaried workers on a day rate basis amounted to a change in their occupational rate in violation of the agreement. Management claimed, however, that nothing in the agreement required it to pay employees for days upon which they were not scheduled to work and the agreement expressly recognized its right to relieve employees from duty for legitimate reasons. Said the arbitrator, "It is clear from the very terms of the agreement that the occupational salaries referred to in the contract are not guaranteed sums received by the employee at the end of each month regardless of the amount of work for which he has been scheduled during that month. Rather, they set forth the amount to be received for the fulfillment of the normal schedule." (In re arbitration between Tennessee Coal, Iron & R. R. Company and United Steelworkers of America)

EMPLOYEES PAID ONLY IF THEY WORKED THE FULL WORK WEEK WERE NOT SALARIED EMPLOYEES

Despite the fact that the contract referred to certain employees as "salaried employees" the arbitrator held they did not enjoy the salaried status, since they were paid the full weekly wage only if they worked the full work week and, under the contract, their vacations were computed on the basis of hours worked. The fact that employees received sick leave and severance pay, which hourly paid employees in this plant did not receive, is not controlling, since many hourly rated employees in other industries receive these same benefits. (In re arbitration between Conmar Products Corporation and United Office & Professional Workers of America)

REPORT TIME PAY DUE

An employee was entitled to report time pay where he reported at the plant upon management's instructions but was told by the watchman at the plant gate that there was no work. The employer, contending that the employee should not receive call-in pay, pointed out that the employee would have been permitted access to the plant had he pointed out, as did other employees, that he was scheduled to work. The employer's contention was rejected, however, since the employee involved had difficulty in understanding and speaking the English language and accepted the watchman's statement of "no work" as final. The employee's coming to the plant, his presence at the gate, and his subsequent

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statement regarding no work indicated a good faith effort on his part to report to work in accordance with his foreman's instructions. (In re arbitration between Chrysler Corporation and United Automobile, Aircraft, & Agricultural Implement Workers of America)

Labor-Management Relations

***ASSIGNING WORK TO OUTSIDE EMPLOYEES PERMITTED**

Despite the fact that the contract provided that employees within the bargaining unit should be given preference for work performed in or about the plant, the employer was permitted to have work at the plant performed by employees of another company, where he had good and sufficient reasons therefor. The arbitrator held that the language of the contract does not make it absolute and unconditionally mandatory upon the company to assign all work under all circumstances and conditions to bargaining unit employees only. "The very presence of the word 'preference' in the language of the clause completely negates any such interpretation, for the word itself clearly implies an element of choice or more than one course or alternative." The arbitrator held that the company's action in this case was in good faith and for *bona fide* reasons, since had it assigned the work to its own employees, it would have been uneconomical, costly, and inefficient. (In re arbitration between Baldwin Locomotive Works and United Steelworkers of America)

***SUPERVISORS ALLOWED TO PERFORM PRODUCTION WORK**

Supervisors were permitted to perform a little production work, even though the work assigned to them was formerly performed by two regular employees possessing greater seniority than they had. The layoff of these two employees and the assignment of their work to supervisors was held to be a management right in view of the fact that supervisors were not included within the bargaining unit, it had been the company's past practice to allow supervisors to do a limited amount of production work, and the amount of work performed by supervisors in the instant case was of a very small amount, consuming only a few hours a week. (In re arbitration between D. M. Steward Manufacturing Company and International Brotherhood of Electrical Workers)

***CONSTITUTED FREE SPEECH**

An employer's talk prior to an election was held by the board to be

* In this classification, items marked with an asterisk also are considered to be trend indicators.

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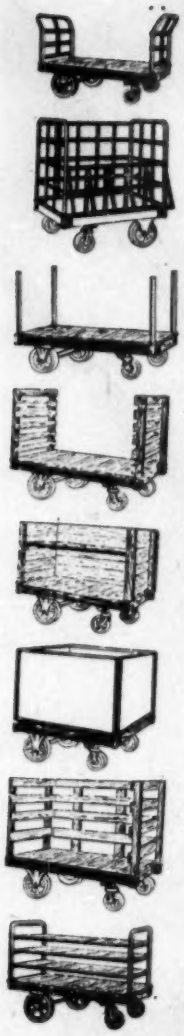

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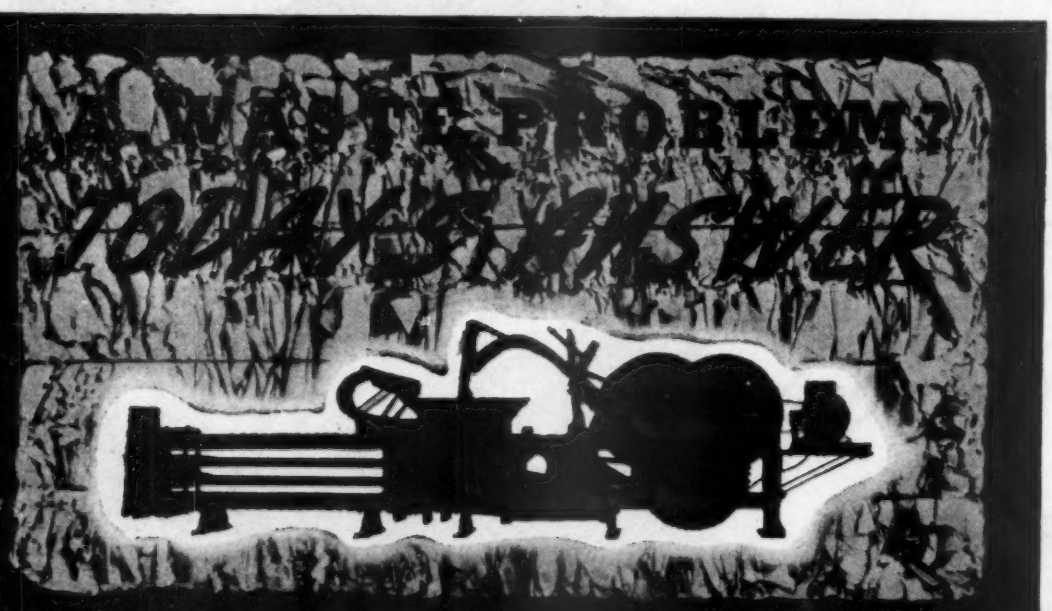

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LABOR DEVELOPMENTS *(continued)*

privileged free speech, since the speeches delivered by high management officials only indicated the employer's preference for dealing directly with its employees rather than through a labor organization, but contained no threat of coercion or promise of benefit. The board has already held in prior cases that an employer's speech to his employees on company time is not *per se* unlawful. (Gray Drug Stores, Inc., and Retail Clerks International Association, NLRB)

*EMPLOYER MAY NOT CHALLENGE UNION'S ACTION

A union-shop contract between a union and an employer does not give the employer the right to question the union's refusal to reinstate a holder of a withdrawal card to active union membership upon his demotion from a job outside the bargaining unit. "It is a fundamental principle that protection of union members from unjust treatment by the union is not the function, privilege, or duty of employer, except under certain few circumstances not here present." (In re arbitration between RKO Radio Pictures, Inc., and Office Employees International Union)

*DISCHARGE NOT JUSTIFIED

Where the probationary clause of the contract provided that after the completion of the trial period the employer would not discharge any employee unless notice was given to the union, containing the reason for such discharge, and the union was given the opportunity to investigate the alleged cause for discharge, an employer unjustifiably discharged an employee after his trial period without notifying the union. The employer claimed that the reason the employee was discharged was because he was "laying down on the job." (In re arbitration between Vaughn Mill Works Company and United Brotherhood of Carpenters & Joiners of America)

*REFUSAL TO BARGAIN

An employer was held guilty of a refusal to bargain where he refused to negotiate on the retroactive application of a proper contract and demanded that the new agreement be effective when signed. The employer also evidenced his refusal to bargain when he conditioned further bargaining on the union's acquiescing in his position that any new contract to be signed would have to be effective when executed. The company was in effect asking the union to withdraw a demand, which was an appropriate subject of collective bargaining, as a condition to further bargaining. The employer's position that he was justified in refusing to bargain on this issue until the question of whether the

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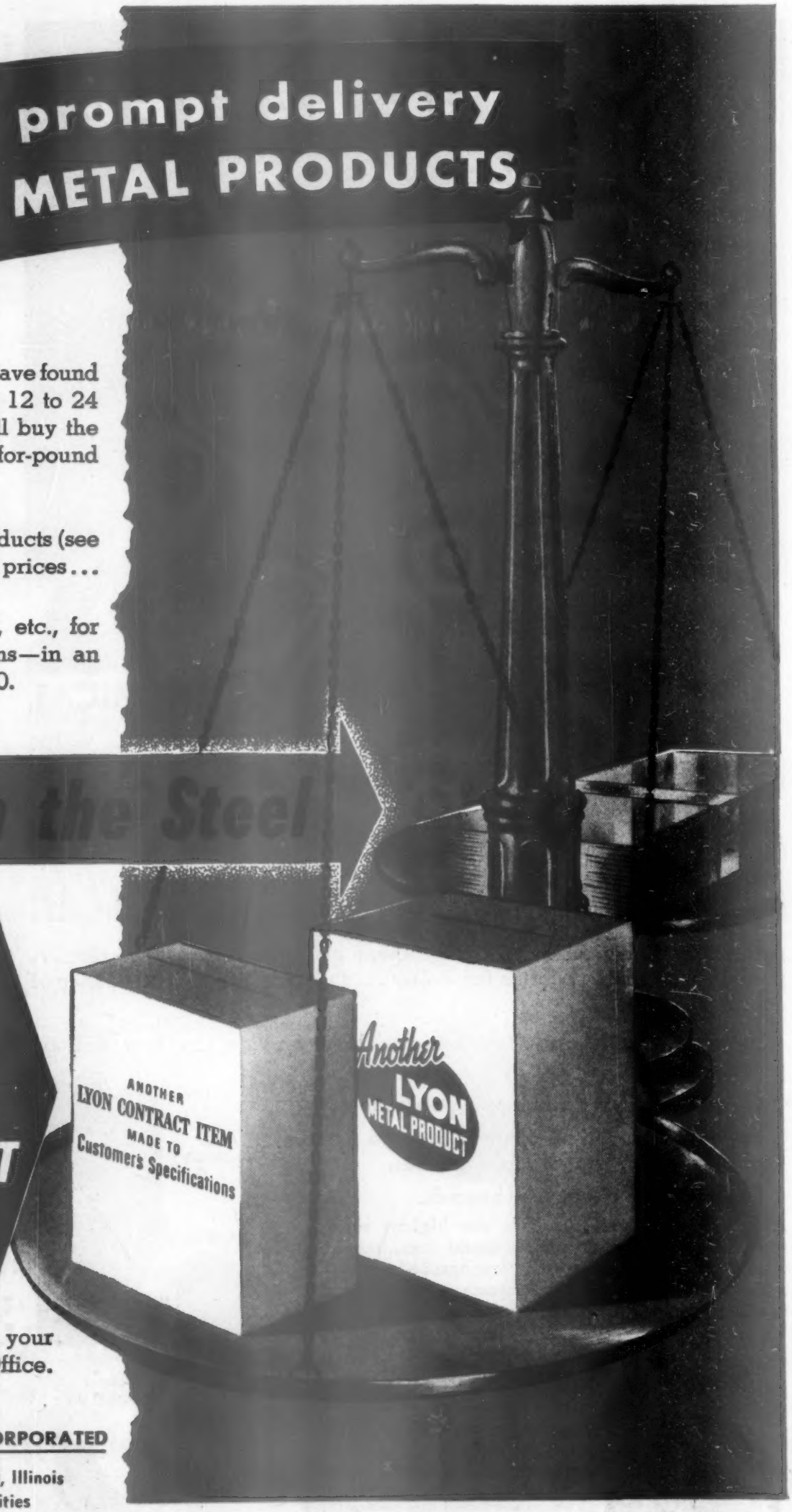

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old contract was still valid had finally been resolved by the courts, was held by the board not to be consistent with the basic purposes of the NLRA that industrial disputes be settled by collective bargaining. (Bergen Point Iron Works and United Electrical, Radio & Machine Workers of America, NLRB)

An employer was unjustified in refusing to bargain with a union claiming that the union had lost its majority status after the election and before it was certified or made its request to bargain. The board held that the employer's defense was not a valid one, since a reasonable test period for the existence of the bargaining relationship had not elapsed in the five months between the election and the employer's refusal of the union's request to bargain. The court pointed out that the Supreme Court had previously held that "a bargaining relationship once rightfully established must be permitted to exist and function for a reasonable period in which it can be given a fair chance to succeed." (NLRB v. Worcester Woolen Mills Corporation, CCA-1)

***NO AUTOMATIC RENEWAL**

Section 8(d) (1) of the Labor-Management Relations Act, which requires the giving of 60 days' notice to terminate or modify a contract, may not be interpreted to mean that the failure to fulfill this obligation will result in the automatic renewal of an existing contract. (Magnolia Petroleum Company and Oil Workers International Union, NLRB)

***AUTOMATIC RENEWAL NO BAR TO DECERTIFICATION**

A contract containing an automatic renewal clause was held not to be a bar to a decertification election, where the union had given the employer notice to amend the contract, thereby effectively forestalling the automatic renewal, and the oral agreement of the parties to continue the contract in effect during negotiations rendered it one of indefinite duration. (Bethlehem Steel Company and International Federation of Technical Engineers', Architects' & Draftsmen's Union, NLRB)

***INDIVIDUAL MAY NOT "FRONT" FOR NON-COMPLYING UNION**

The National Labor Relations Board was justified in denying an employee a hearing before conducting an election and in refusing to place her name on the ballot, despite the fact that the employee claimed to represent the employees as the bargaining agent. The board had found that the employee was merely a "front" for the union which was no longer qualified to be the bargaining agent, since it had failed to comply with the filing requirements of the Labor-

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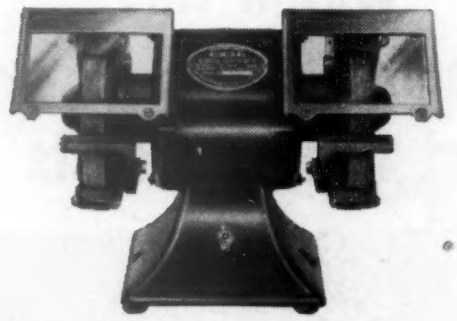
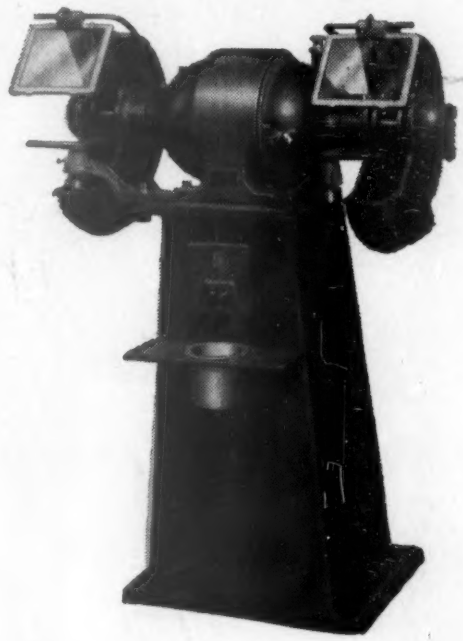


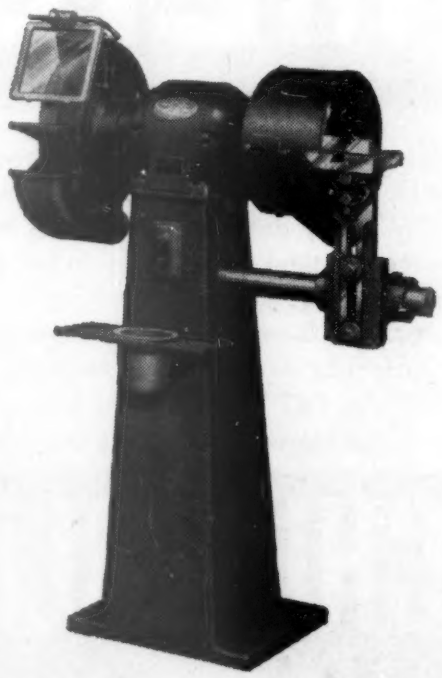
Admiral 6" Bench Grinder

Model 625. Ball bearings in dust-proof housings. Adjustable guards and tool rests. Shatter-proof eye shields. Guards removable for buffing—polishing. ¼ Hp. 3600 rpm.



Metalmaster Heavy-Duty Grinder

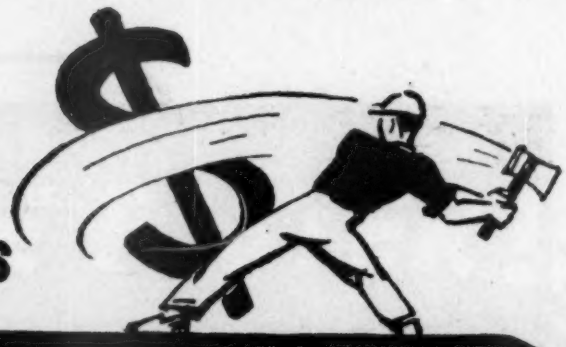
Model 200. Ball bearings in dust-proof housings. Wheel guards adjustable radially. Hinged doors on guards. Motor totally enclosed, 220/440, 550 volts, 50 or 60 cycles, 2 or 3 phase. 2 to 7½ Hp. 1800 rpm.

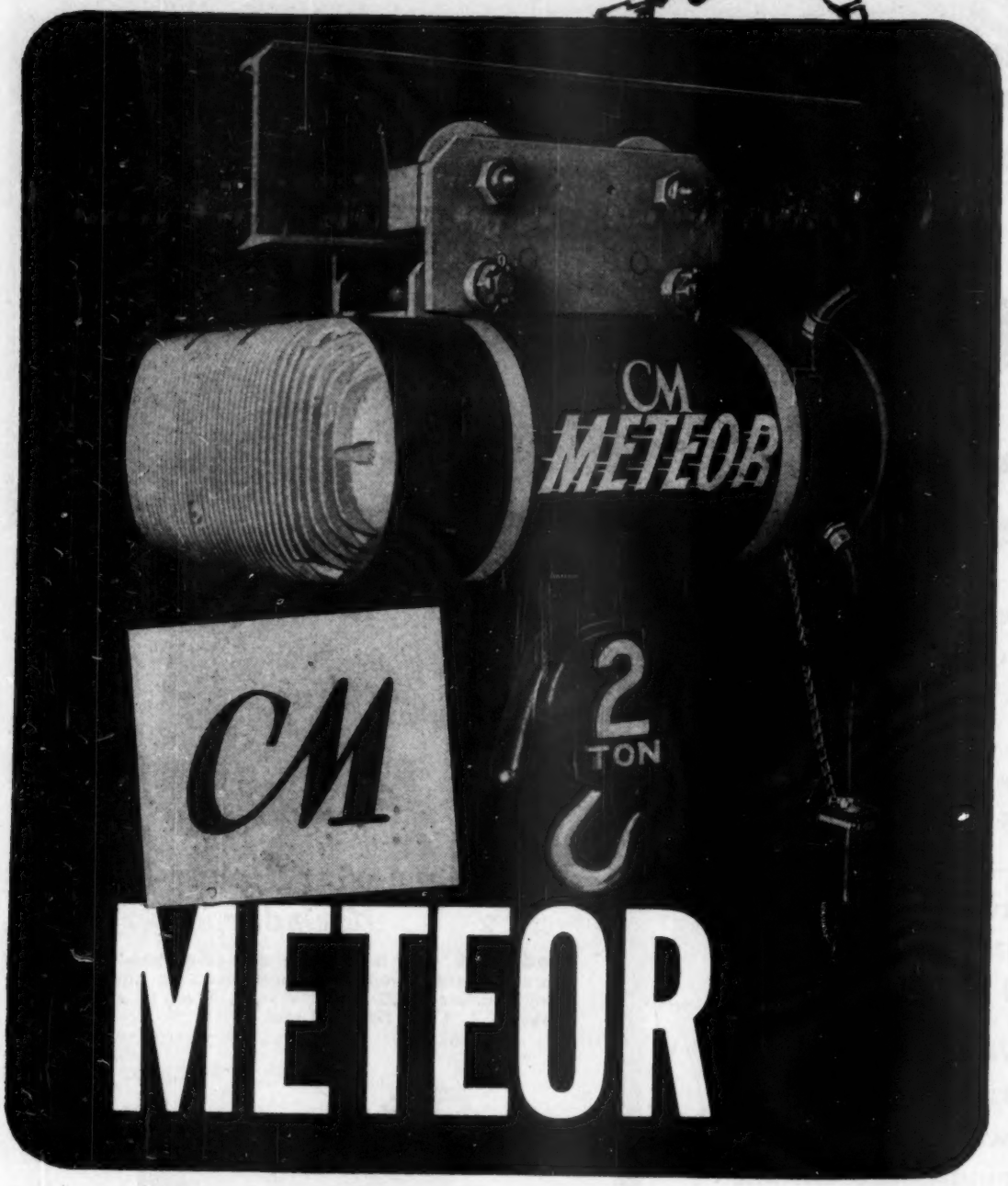


Metalmaster Carbide Tool Grinder

Model 260. Left side rough grinding, right side finish grinding. Work table precision machined, adjustable 0°-45° and to height and tool wear. Motor totally enclosed, 220/440, 550 rpm, 50 or 60 cycles, 2 or 3 phase. 1 or 2 Hp. 1800 rpm.

Watch this Electric Hoist cut handling costs





SEE the speedy Meteor in action and you'll agree that materials handling costs are down for the full count. This heavy duty electric hoist is an outstanding performer . . . a time and money saver. Helical gears, airplane type cooling, low headroom, thermal protection, only 110 volts at push button station . . . and speed . . . are but a few of the Meteor's notable features. Bulletin 142 will tell you about all of them. Better still, the Meteor itself will bring you all of them.

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LABOR DEVELOPMENTS *(continued)*

Management Relations Act. (White v. Herzog, USDC, D. C.)

***UNION MAY NOT SUE TO RECOVER WAGES FOR EMPLOYEES**

While a union may maintain an action to enforce an agreement with the employer under which the employer promised to comply with the determinations, recommendations, awards, directive orders, and decisions of the War Labor Board, it may not maintain an action to recover wages allegedly due employees for work performed for their employer. Such an action, the court held, may be maintained only by employees themselves. As to the second cause of action, "that cause is one on behalf of individuals whereas plaintiff may act for its member employees only in cases where it is acting as collective agent for them." (Kaufman v. M. T. Davidson Company, N. Y. Sup. Ct. Special Term, Part III, New York County)

***RIGHT TO PICKET**

Despite the fact that a union has no members among the employer's employees, it may still picket to unionize them. (Pappas v. Mesevich, N.Y. Sup. Ct. Special Term, Part I, Bronx County)

***LIMITATION ON PICKETING**

The court has the right to issue an order limiting the number of pickets that may be maintained by unions at the employer's business. (People of California v. Ancker, Calif. Sup. Ct., Appellate Dept., Los Angeles County)

***EMPLOYEES ENTITLED TO HOLIDAY PAY**

Under a contract providing that employees shall be paid for certain designated unworked holidays, employees were entitled to be paid for a holiday which fell during a week of vacation. The arbitrator rejected the company's contention that since July 4 fell within a vacation week, it was not a holiday occurring during the regular work week, and that consequently employees on vacation during that week were not entitled to pay. (In re arbitration between W. W. Kimball Company and United Brotherhood of Carpenters & Joiners of America)

***REFUSAL TO ACCEPT OVERTIME**

While an employee may refuse to accept an overtime assignment under a contract which does not give the employer the absolute right to schedule overtime, this right is contingent upon the employee's serving the employer with prior notice to that effect. A disciplinary suspension was therefore a proper penalty for an employee who refused to work overtime, especially since the assigned task of the employee, which he had accepted for a few years without objection, involved a

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Complete selection and availability are not the only advantages in dealing with Crane, however. To standardize on this **One Source of Supply** is to simplify every piping procedure, from design to erection to maintenance work. **One Responsibility** for all materials helps you get better installations, avoids needless delays. And in every item from Crane, **High Quality** is your best assurance of dependable performance from every part of your piping systems.

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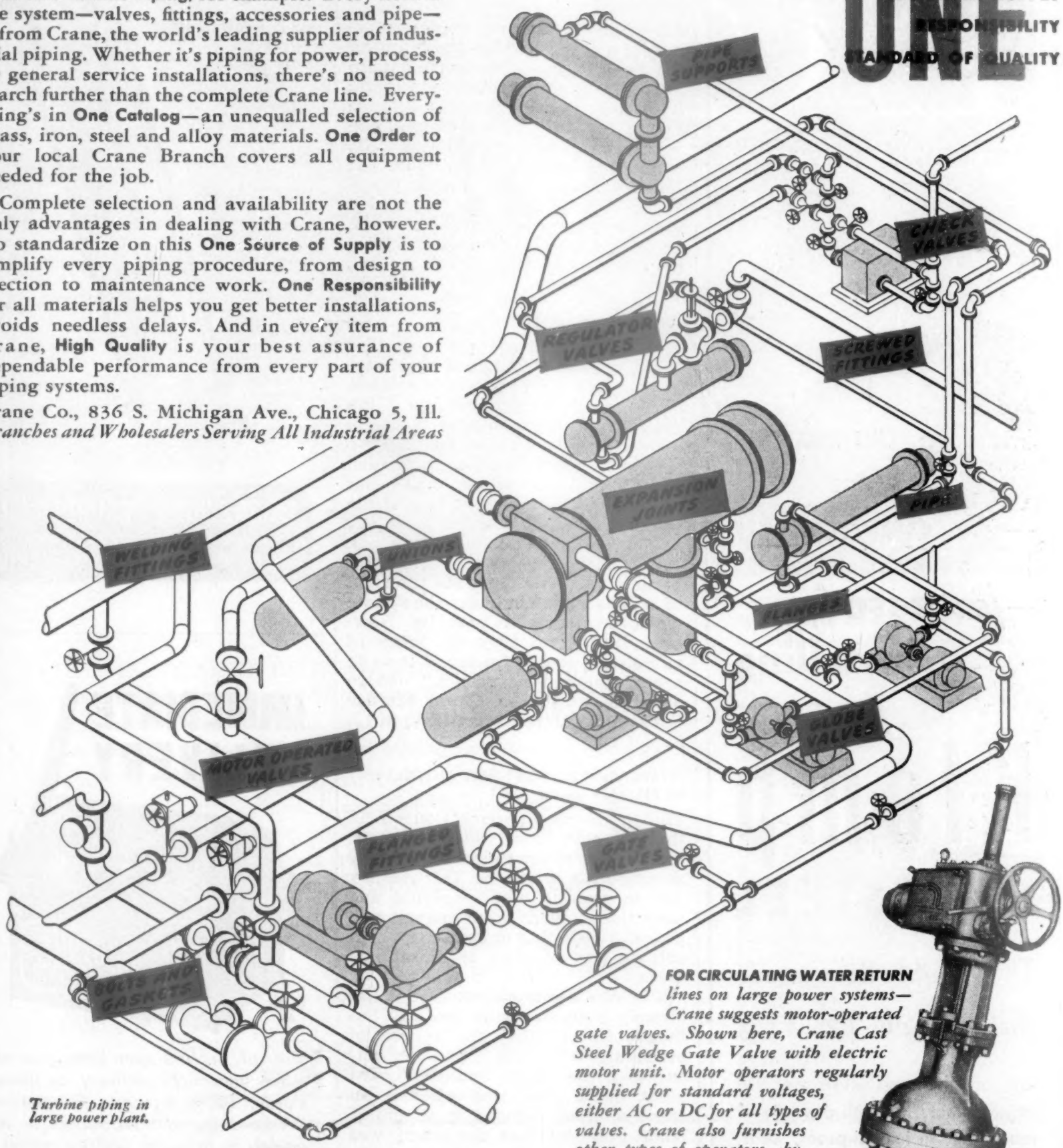

Turbine piping in large power plant.

FOR CIRCULATING WATER RETURN *lines on large power systems—Crane suggests motor-operated gate valves. Shown here, Crane Cast Steel Wedge Gate Valve with electric motor unit. Motor operators regularly supplied for standard voltages, either AC or DC for all types of valves. Crane also furnishes other types of operators—hydraulic, air, etc. See your Crane Catalog.*

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LABOR DEVELOPMENTS *(continued)*

daily overtime period. (In re arbitration between U. S. Rubber Company and Industrial Union of Marine & Shipbuilding Workers of America)

***ARBITRATION MANDATORY**

An employer may not refuse to arbitrate a dispute which arose during the term of the agreement containing a provision for arbitration merely because the contract has expired. The fact that the contract is no longer in existence is immaterial. The employer is not obligated under the contract, however, to arbitrate grievances arising after the expiration thereof. (In re arbitration between Lane v. Endicott Johnson Corporation, N.Y. Sup. Ct., Appellate Div., Third Dept.)

***HELD NOT ARBITRABLE**

Where the contract provides that "nothing herein contained shall subject the following matters to arbitration, namely wages, hours . . ." the revision of work quotas for employees employed under an incentive system is not arbitrable, since such a revision involves wages. It was pointed out by the court that if the company desires to excite a higher degree of production, it may do so through the process of collective bargaining. "The court has the right to order arbitration under the statute when the contract so provides. However, it will not vary the terms of an existing contract nor will it write a new one for the parties." (In re arbitration between Gould Storage Battery Corporation v. UEW, N. J. Sup. Ct.)

***STATE COURT DOES NOT HAVE JURISDICTION TO RESTRAIN UNION**

The California Supreme Court held that its state court does not have jurisdiction of an action brought by an employer under the Taft-Hartley Act to restrain non-complying and uncertified unions from engaging in peaceful picketing or secondary boycott as part of their organizational drive.

The court pointed out that it has already been stated by the U.S. Supreme Court "that the course of procedure was definite and restricted; that the board and the board alone could determine whether an employer had engaged in an unfair labor practice; that the board was chosen as the instrument or agency, exclusive of any private person or group, to assure protection from the described unfair conduct in order to remove obstructions to interstate commerce, and that the board alone was authorized to take proceedings to enforce its order. The sole authority of the board to secure prevention of unfair labor practices affecting commerce was thus recognized." (Gerry v. Superior Court, California Supreme Court)

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Ledeen Heavy Duty Cylinders do the work easily; saving time and effort.

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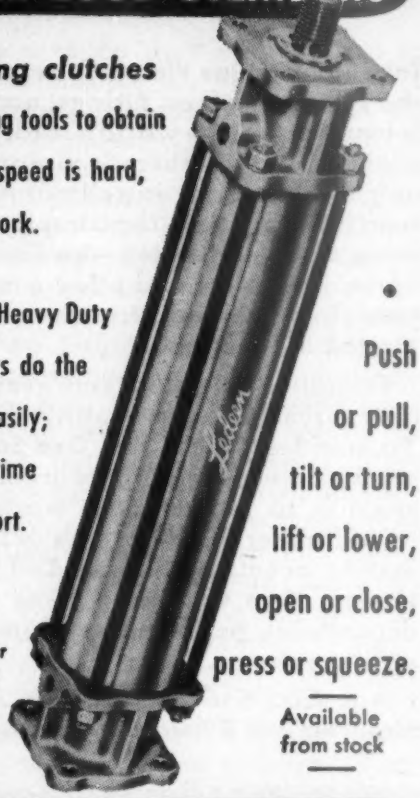

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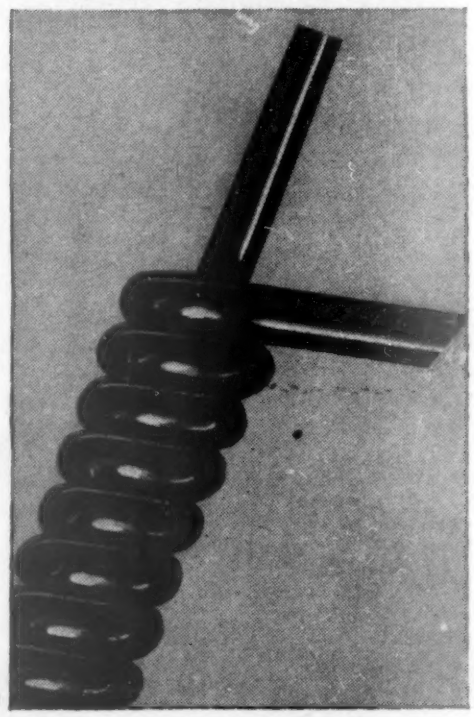

TRY ITS ABRASION RESISTANCE, to learn how tough an insulation is. Roevar Magnet Wire shows a three-to-one advantage over standard enameled wires. And such superiority makes Roevar wire your first choice for high-speed winding operations.

Besides its strength and toughness, Roevar Magnet Wire insulation has high dielectric qualities, is extremely flexible, and has exceptional resistance to solvents used in coil-treating varnishes. Importantly, too, Roevar Wire costs less and is of smaller diameter than magnet wire with paper, cotton or silk insulation. It is furnished in sizes No. 14 to 40 A.W.G.

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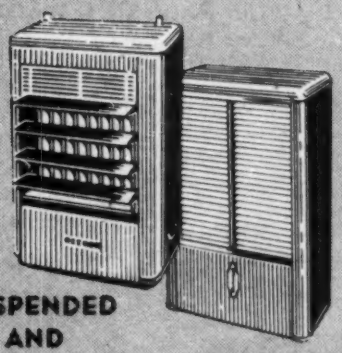

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THEY SAY AND DO

Management-Union Program Sets Safety Record

The weaving mill of Forstmann Woolen Company, Passaic, N. J., has run more than 4½ million man hours without a lost time accident. This weaving mill figure is a record for the textile industry and for all industry in New Jersey. As a result of a joint labor-management safety program, Forstmann is the only wool textile mill to win the National Safety Council's distinguished service to safety award two years in succession.

The safety program operates within a framework provided by a joint safety council of five labor and five management representatives, and by 16 departmental safety committees composed of two foremen and two union members each, with a mill overseer or assistant overseer as chairman. In order to keep safety matters entirely apart from controversial issues, none of the union representatives may hold union office.

A noteworthy feature of the Forstmann plan has been the company's insistence, from the first, and the union's full agreement, that ultimate responsibility for safety remain with the company's supervisory force. Thus the departmental committees and the joint safety council itself can only suggest and advise. They do so, however, with the force of the union's collective bargaining machinery and the company's safety and health department behind them.

Monthly meetings and a constant exchange of reports and data among the council and departmental committees provide the necessary communication system to assure steady attention to the safety program.

Need for Technological Development

WILLIAM J. KELLY, President, Machinery & Allied Products Institute, speaking before Council for Technological Advancement

That the technological development of the United States is one of the most vital factors contributing to our future security and outlook is self-evident to all thinking persons. It is equally self-evident that the advantages of technological advancement of the well-being of the United States and its people will be challenged, through lack of understanding, from time to time in the future, as they have been in the past. The fact is that the over-all factors conditioning our economy and determining the extent to which it is dynamic and progressive, are complicated with many interacting relationships which are not well understood by American business, not to say by the general public.

The success with which these challenges are met as they arise in the future, will be dependent very largely upon the understanding of American businessmen and the American people generally of the part played by technological advancement in providing individual incentives, in the further development and security of the country, and in the progress of its people.

What Education for Business Careers?

The professor and the businessman do not see eye to eye on the type of education a college student should have for a successful career in business. This is the major conclusion drawn from a 2-year study just completed by the Society for the Advancement of Management.

SAM's survey was based on two polls of 5000 heads of business concerns and executives. Simultaneously, 500 professors, deans, and instructors of the nation's principal colleges were queried on various aspects of business education.

According to the report, college courses for students who choose business as a future, neglect those qualities necessary for successful business management. Citing examples, the survey shows that such subjects as accounting, salesmanship, public relations, workings of the business enterprise, and commercial and industrial law, play a very small part in the curriculums of students who have selected business as a future vocation.

In addition, the report calls for a greater liaison between businessmen and college heads to plan courses which would equip the college graduate for business. To back this point, the survey indicates that 83 per cent of the professors agree that greater participation by industrialists in college training is one of the major ways in which to fill the gap in business education.

A breakdown of the 23 subjects that businessmen feel would give a student a well-rounded preparatory course for future commercial careers includes, in order of importance: English composition, literature, and public speaking; economics; general accounting; types of industrial and business organization; relation of government to industry and business; labor relations and labor laws; commercial and industrial laws; government; corporation finance; cost accounting; production methods; psychology; case problems in management principles; history of industrial

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for heavy impact applications...

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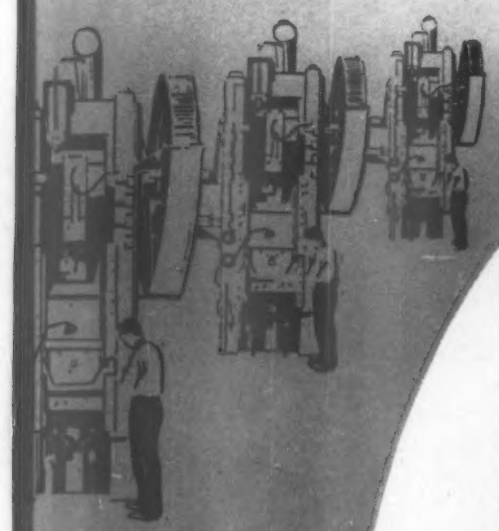

Various Bulletins available on Vibration Control Mountings, Flexible Couplings and Bonded Rubber Products. For applications providing vibration isolation regardless of direction of disturbing forces, Bulletin No. 106; for applications isolating vibration but not subject to intense shock, Bulletin No. 104; for applications involving transient shock loads in addition to vibration, Bulletin No. 103; Flexible Couplings, Bulletin No. 200-C; Chan-L-Mounts, Bulletin 300.

With the introduction of SHOCKMOUNTS the Lord Manufacturing Company makes another notable contribution to the problem of vibration control. They extend effective vibration isolation and control to machines of such size and weight that previous attempts to combat their enormous forces of impact have been confined to massive foundations to achieve inertia and to more or less resilient footings.

SHOCKMOUNTS will lend an increased span of life to such machines; to neighboring machines; and to the building itself. They make it possible for the first time to deal with vibration control on a factory-wide basis, regardless of the size or nature of machinery in use . . . with a consequent improvement in quality and amount of production, and in employee morale.

Low and compact, Lord Shockmounts are easily placed under existing equipment for bolting to floor and machine. The flexing element, synthetic rubber which is bonded to 3/16" steel, is designed for minimum stress at maximum load, insuring high safety factor and long life. The top is folded down to shed oil and dirt and to limit horizontal movement, providing greater stability. Load capacity, up to 7500 pounds per mount.

Want to know more about Shockmounts? ***For detailed information write for Bulletin 400.***

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development; advertising; distribution methods; budgetary control and procedures; taxes; public relations; marketing research; general chemistry; physics; algebra; geometry; calculus; industrial psychology; personnel selection and placement.

The main criticism of college graduates in summary was that they do not have the right attitude toward their jobs, or their business associates, as expressed in lack of industry and initiative, delusions of grandeur, and inability to get along with people. They want to start at the top and advance rapidly from there. They want a lot of money, but do not want to work or get their hands dirty earning it.

However, the survey reports, this attitude appears to be a reflection of the relatively tender age of graduates, and their lack of acquaintance with the realities of life.

Study Shows Labor Pattern

The trend toward a stable and constructive labor relationship in mass production industries is indicated in the second report issued by the National Planning Association's committee on the causes of industrial peace under collective bargaining.

The report is on Libbey-Owens-Ford Glass Company, and the Federation of Glass, Ceramic & Silica Sand Workers of America-CIO.

Libbey-Owens-Ford, like the automobile, steel, rubber, and other mass-production industries, has had its share of industrial strife, the committee said; however, day-to-day operating relationships at L-O-F are good.

The significance of this case, the committee states, is that "the management and the union appear to be moving forward to a stable and constructive relationship." Their experience may be indicative of a trend in the mass-production industry; it may indicate a pattern for the future.

Our Top Worries Are Reds and Inflation

In a recent survey, General Electric Company found that Communism and inflation are the two top worries of employees and public alike, running 9 to 1 and 8 to 1 respectively, ahead of the next worry, which is the difficulty between management and unions.

Suggestion Plan Pays Off

More than 5000 employee suggestions have been adopted by Remington Rand, Inc., since the spring of 1945 when this company's suggestion plan was organized. Suggestions

Roto-Clone takes buffing dust off the danger list

One of seven Type N Roto-Clones servicing buffing stands in this metal finishing department.

BUFFING metal parts in this finishing department produces a fibrous, greasy dust that could be both a health and fire hazard. But not here—as fast as this dangerous dust is produced it is whisked away by a Type N Roto-Clone*.

The Type N Roto-Clone is a wet-type collector which combines centrifugal forces and intimate intermixing of water and dust-laden air for extremely high cleaning efficiency. Compact in design, this unit has no moving parts to foul and requires little maintenance. And the once dangerous fibrous, greasy dust is converted into a harmless sludge which is easily removed.

Whether you have one or a battery of buffing stands, there is a Type N Roto-Clone of a size and capacity that will remove and store this dust safely and efficiently. Bulletin No. 277 describes this unit in detail. Ask your local AAF representative for a copy or write direct to—

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. . . but it's a different story with workers in your plant. They slip and fall on smooth, slippery floors . . . then lost man-hours start piling up. Wherever sure footing is essential in your plant, install U·S·S Multigrip Floor Plate and get skid resistance and traction in all directions . . . wet or dry!

Multigrip is easily cleaned . . . there are no pockets in which grease, dirt and water can accumulate. The evenly spaced, flat-topped risers are comfortable underfoot, tend to lessen fatigue. Multigrip installations are permanent, reducing plant maintenance cost.

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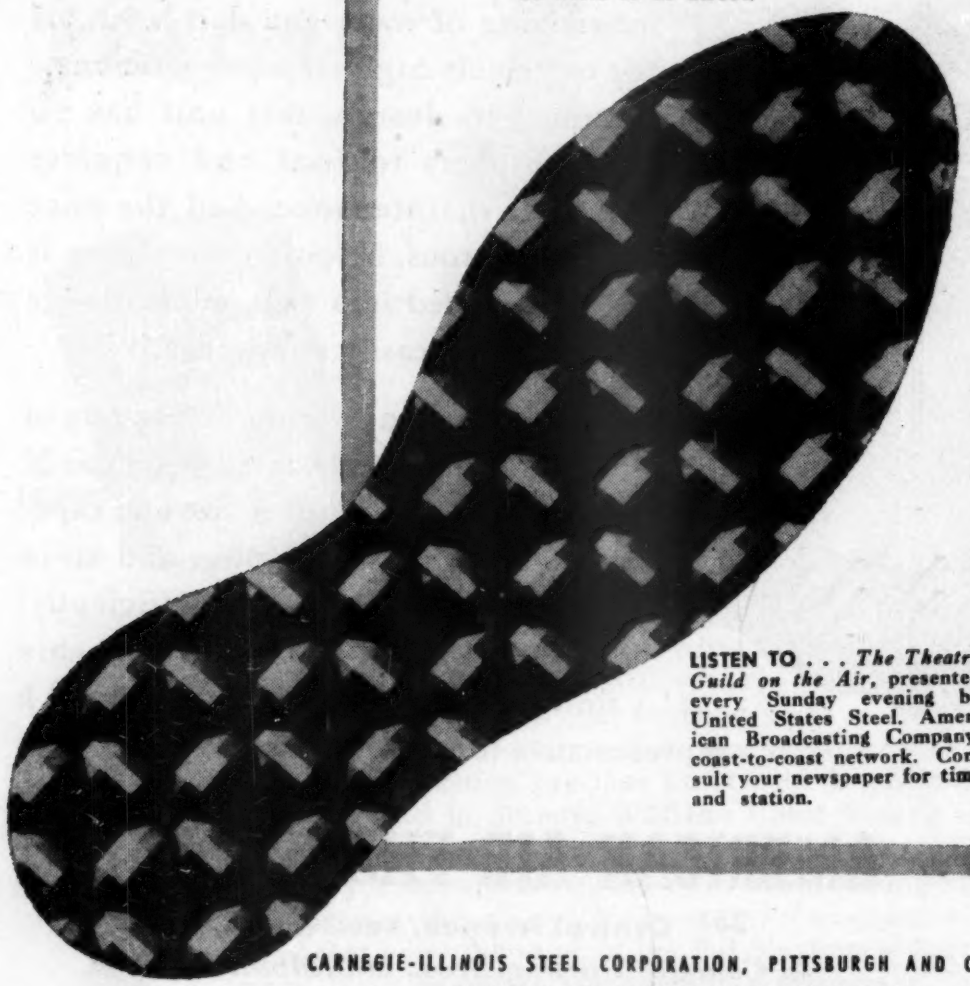

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have been adopted on an average of 210 monthly. Top individual awards were made to two employees in the amount of $1500. Employees netted more than $100,000.

Getting Together With Labor

FRED MAYTAG II, President, The Maytag Company, speaking before National Association of Foremen

I happen to hold the view that much of the labor unrest of recent years is management's own fault; that along with self-serving, or misguided labor leaders, we must share the blame for bad human relations. Too often we have either handled labor relations in our spare time, or tried to delegate them to an overworked and understaffed personnel department, instead of treating them at the level of the individual worker and his immediate superior. On occasion I have said, more than half seriously, that some of us have been so busy fighting with organized labor, that we haven't had time to inquire into the fundamental reasons for its acting the way it does.

I don't want anyone to conclude from these remarks that I believe in a "soft" labor policy. Quite the contrary. But I do believe that, while being firm, we must try better to understand that the people we are dealing with are human beings; we must deal with them accordingly, on a basis compatible with fundamental human dignity.

Management and labor have so much in common and so few real differences that neither can afford the luxury of fighting. Instead we need to work together toward achievement of a common goal, of producing more goods at lower cost, and distributing them equitably among all people.

Capital Invested Makes Better Jobs

PAUL F. CLARK, President, John-Hancock Mutual Life Insurance Company, speaking to the Life Agency Management Association

The workman who, 100 years ago, labored 70 hours a week for bare existence, did most of his work with his hands. It took only $500 of capital to provide the facilities of production he used. Today the great-grandson of this worker uses tools that require 12 times as much capital. He works 40 hours a week and earns in dollars about 16 times as much as his ancestor. In purchasing power, his earnings are about five times as great. It is interesting that over the century, the gross value of this worker's production has increased in almost exact proportion to the amount of capital invested in his job. No longer is the worker's output measured by the limits of his muscular strength.

Today's worker produces more and

the grinding job

Off-hand sharpening of a carbide tipped tool, on 14″ Hammond Tool Grinder. Widespread and increasing use of these tools makes this an important every day operation in many plants. Correct wheel selection for this specialized work is essential for efficient sharpening without damage to carbide tips.

the wheel

G Electrolon, GC80-I9-V3, 14″ x 4″ x 11″, plate-mounted, Type PM, specially developed to prolong the efficiency of cemented carbide tools with economical grinding cost. Accepted as a standard of excellence throughout industry.

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Every size and shape for every grinding job . . . centerless, crankshaft, cut-off, cylindrical, internal, knife grinding, mounted points, portables, roll grinding, saw gumming, snagging, surfacing (wheels and segments), tool and cutter, bricks, sticks, stones and abrasive grain for polishing, pressure blasting, anti-slip, etc.

where to get it

Simonds Abrasive Distributors in all principal industrial centers in the U.S. and in many foreign countries carry stocks and can advise on grinding wheel selection. Write now for Bulletin ESA-181 "G Electrolon Wheels for Carbide Tool Grinding". Also request name of nearest distributor.

SIMONDS ABRASIVE CO.
Philadelphia, Pa.
Grinding Wheels and Abrasive Products

SIMONDS CANADA ABRASIVE CO. LTD.
Arvida, Quebec
Electric Furnace Abrasives

SIMONDS ABRASIVE COMPANY
is a division of
SIMONDS SAW AND STEEL CO.
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SIMONDS STEEL MILLS
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Special Steels

SIMONDS CANADA SAW LTD.
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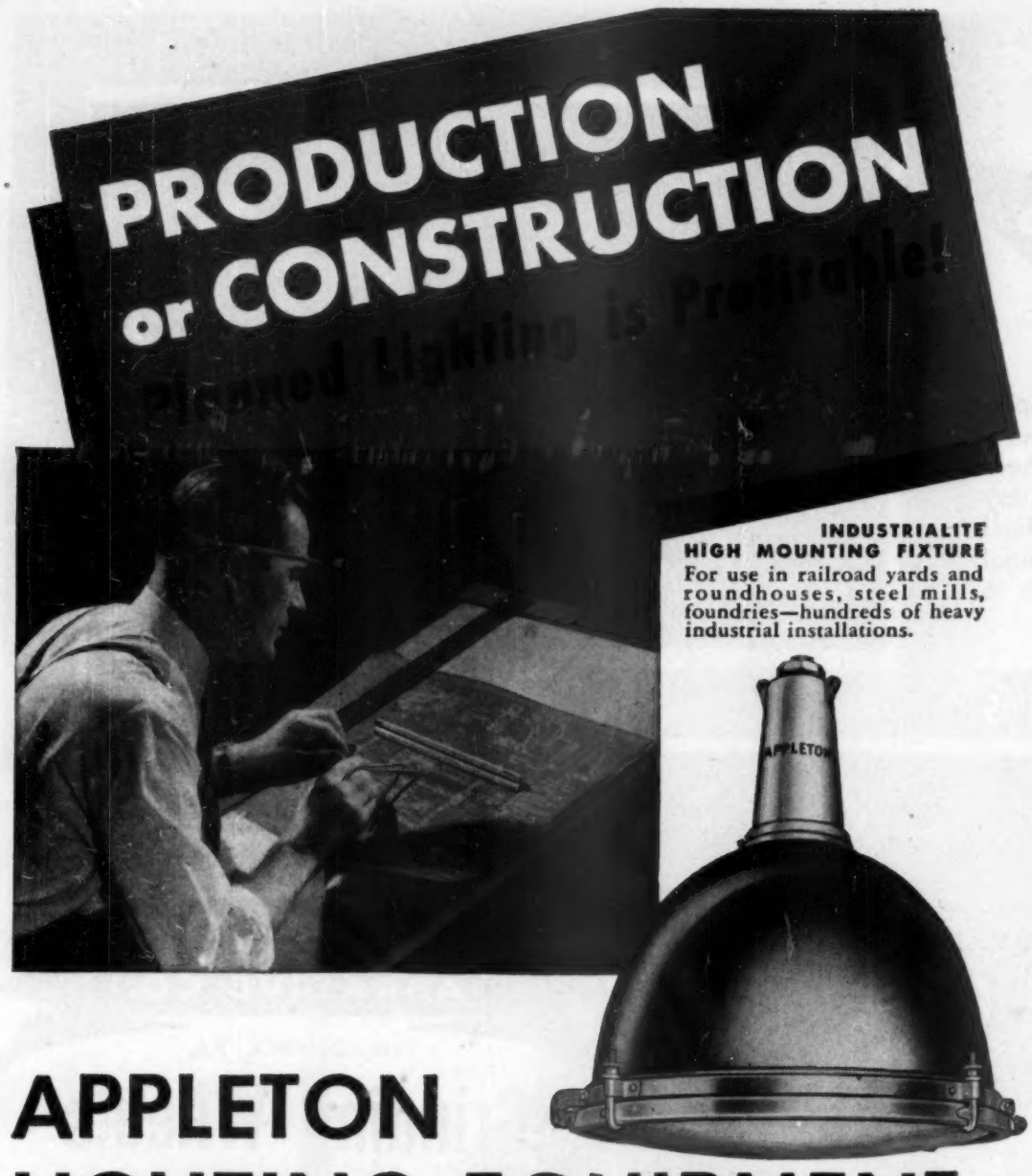
Simonds Products for Canada

Simonds Abrasive Company, a major manufacturer of grinding wheels and abrasive products exclusively, maintains a modern electric furnace plant at Arvida, Canada. Here the crude abrasive used in making Simonds grinding wheels is produced. Thus, product quality is controlled from the source, assuring you of lasting performance, top efficiency, better economy when you use Simonds Abrasive wheels on your grinding jobs.

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PENNA. • DISTRIBUTORS IN ALL PRINCIPAL CITIES



INDUSTRIALITE HIGH MOUNTING FIXTURE
For use in railroad yards and roundhouses, steel mills, foundries—hundreds of heavy industrial installations.

APPLETON LIGHTING EQUIPMENT

To plan lighting with Appleton Lighting Equipment is to more than meet the illuminating requirements of profitable production and lasting electrical construction.

Appleton Lighting Fixtures are manufactured in a variety of types and sizes to fit virtually every industrial job—indoors and out. They are quickly, easily installed, require a minimum of servicing and deliver maximum lighting efficiency at low operating cost.

The Industrialite High Mounting fixture shown above is typical of Appleton specialized design. Ruggedly constructed to deliver top performance under the most severe conditions, this fixture carries a flange on its cast aluminum hood that eliminates the possibility of the reflector jarring loose and falling to the ground.

Custom-made for profitable planned lighting, every one of the products in the Appleton Line of lighting equipment represents the combined result of top quality materials and expert engineering: STANDARD FOR BETTER WIRING.

INDUSTRIALITE ANGLE FIXTURES
Designed to meet the most severe industrial requirements. Supplied with cast aluminum hood which carries flange to prevent reflector from becoming disconnected.

Sold Through Electrical Wholesalers

APPLETON ELECTRIC COMPANY
1715 Wellington Avenue • Chicago 13, Illinois
Branch Offices and Resident Representatives in all Principal Markets

APPLETON ELECTRIC PRODUCTS Reg. U.S. Pat. Off.

SEND TODAY for big Appleton Catalog, illustrating and describing more than 15,000 types and sizes of wiring equipment, gladly sent FREE, on request, to any user of such material.

APPLETON
CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES
EXPLOSION-PROOF FITTINGS • REELITES

he earns more. In 1908 when the automobile industry was young, it took one man eight hours to shape the top half of a gasoline tank. Today a man, plus a machine, can do the same job in one minute. To produce an automobile by the hand method of 40 years ago, and at today's basic wage, would cost more than $50,000. Under today's machine methods, it is possible to buy that $50,000 worth of automobile for about 5 per cent of that price.

Before a man can go to work in the average American industry today, someone must put up $6500 in cash to provide the machines, tools, and plant facilities he will use. To supply this cash is the job of the capitalist. And just who is that capitalist? The answer is you, whoever and wherever you are, if you are living under American free economy. It is every man and woman who has a life insurance policy, a savings account, a bond, or a share of stock.

In America a capitalist is the average prudent and thrifty individual who saves a part of his income every pay day. It is a man setting aside something for old age. It is any one of millions of people willing to deny themselves some of the luxuries of today, to provide the necessities of tomorrow.

The most reliable statistics available in Washington indicate that 90 per cent of all the stockholders in this country have incomes of less than $5000 per year. In 1944, the latest year for which tax returns are available, more than half of all the corporation dividends paid went to this 90 per cent. In the same year, more than $150 million in dividends and interest was reported by tax payers whose adjusted gross income was less than $1000.

And these are only the direct investors. There are also the 50 million savings bank depositors who, together with 75 million life insurance policy holders, have created a capital of about $200 billion. Since there are only 2½ million persons in the country whose income is more than $5000 a year, and only 138,000 who get more than $25,000 a year, it can be seen that the great bulk of American capital certainly does not come from the rich, but from the average American.

A Fair Wage for Capital

These people of modest income, who have exercised self-denial to supply the capital that creates goods, want a fair wage for the work their savings do. It is not surprising that they are no more willing to invest without pay than a workman is willing to labor without pay.

The stockholder's wage, which comes out of the profit of industry, is the principal target of the enemy

NEW

Speed and Ease in Mimeographing

For Industry—

—Get-ready time no more than a moment—then up to 3 copies a second.

With brief training any operator can turn out professional-looking, easy-to-read copies of anything written, typed or drawn.

Flexamatic Control—exclusive with the new A. B. Dick mimeographs—accommodates a wide range of paper and card stocks in sizes up to 9 x 16 inches.

Investigate the speed and ease of mimeographing made possible with these new machines. For use with all makes of suitable stencil duplicating products. Look in the phone book or write for the name of your nearby A. B. Dick Company branch or distributor. A. B. Dick Company, 720 West Jackson Boulevard, Chicago 6, Illinois. The Mimeograph Company, Ltd., Toronto, Canada.

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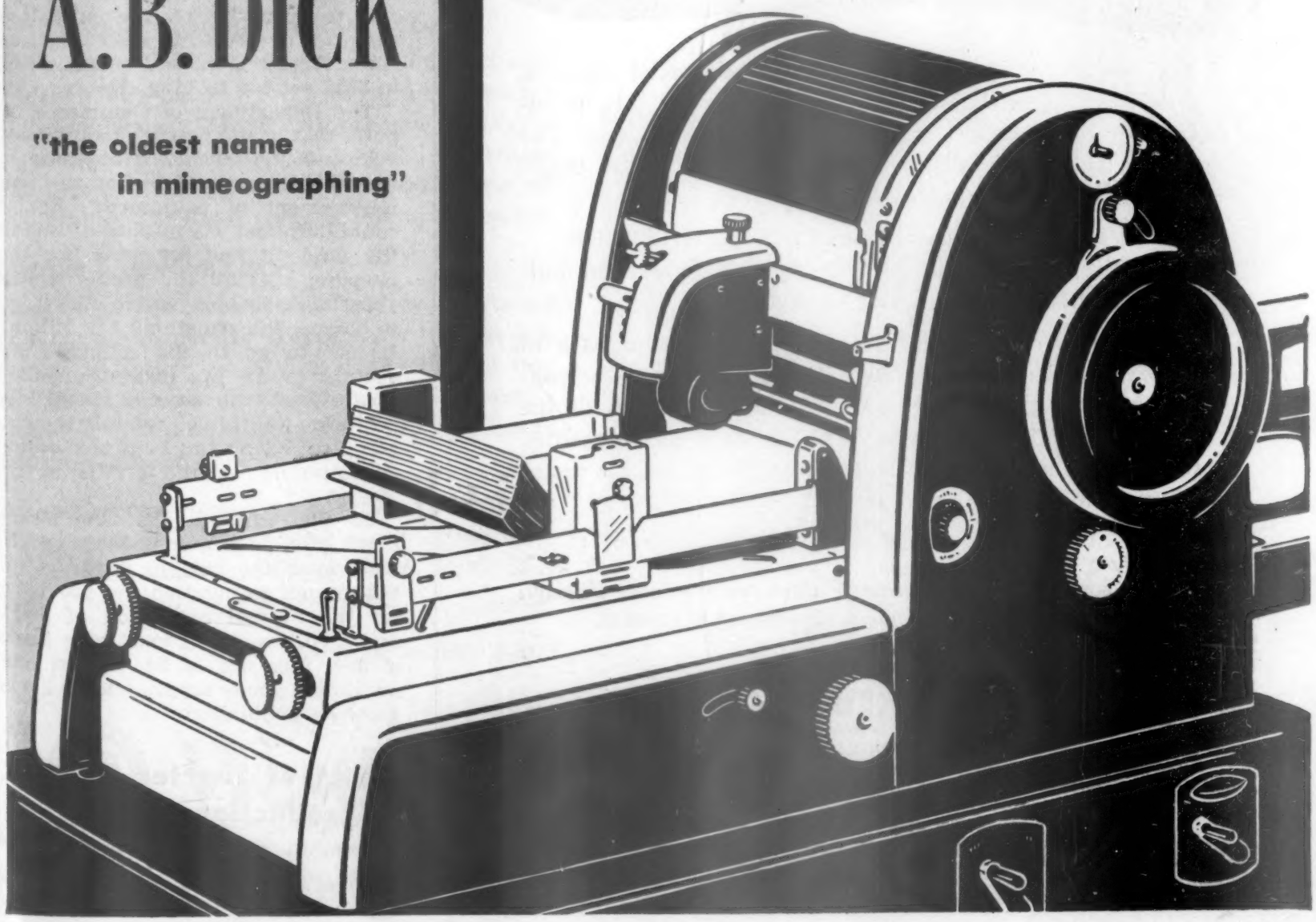

modern plant design includes LUNKENHEIMER VALVES

...at INGALLS-SHEPARD DIVISION
WYMAN-GORDON CO.
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ARCHITECTS AND ENGINEERS
SCHMIDT, GARDEN & ERICKSON
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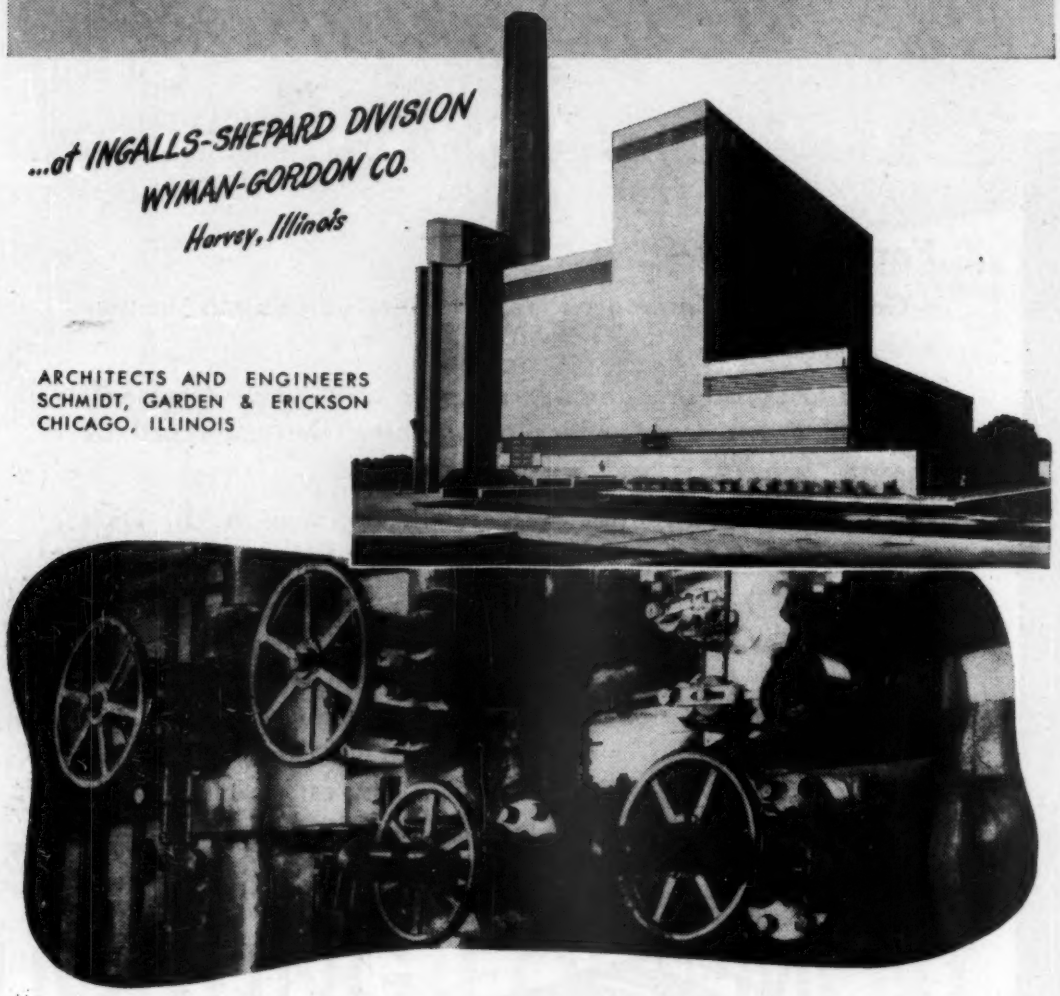

Housed in a strikingly modern, all-reinforced concrete, windowless building, the power plant of this manufacturer's forge shop is a picture of modern efficiency. The list of principal suppliers reads almost like "Who's Who" of power house equipment manufacturers.

Among these big names is that of LUNKENHEIMER . . . identifying high and low pressure valves that serve in multiple installations on lines and equipment.

The 85-year old LUNKENHEIMER reputation back of a widely varied line of quality valves has gained the confidence of planning and operating men alike. That's the reason LUNKENHEIMER VALVES are so often specified for modern installations . . . for long life, minimum maintenance and true, low-cost service.

Lunkenheimer Valves are available through Distributors in all industrial centers.

ESTABLISHED 1862
THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI 14, OHIO, U. S. A.
NEW YORK 13 CHICAGO 6
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EXPORT DEPT 318-322 HUDSON ST., NEW YORK 13, N. Y.

More Power to Industry Through LUNKENHEIMER VALVES

of capitalism, who blames high prices on what he terms this "exorbitant" profit. Suppose we eliminate all profit. What would that do to the cost of living?

There is a reliable answer to that question in official government records which show that corporate profits in 1946 amounted to about 6.2 per cent on sales.

In a sense, that 6 cents out of the dollar you spent bought you more than all the rest of your dollar, because it paid for all the machines that produced the article—and the machines accomplished 85 per cent of the work. Only 5 per cent was done by human energy, but you paid ten times as much for that work as you did for the machine, so that 60 cents of your dollar went into the pockets of the workmen.

Only half of that 6 cent profit was the stockholder's wage. The investors who paid for the machine got only 3 cents of your dollar. The balance went back into the business to meet rising costs of materials and supplies, and increased taxes. Out of that balance had to come the cost of replacement of plant and equipment, because these things wear out and replacing them at rising costs takes more money than ever before.

For example, it takes twice as much money to provide the plant and machinery necessary to produce a ton of steel today as it did before the war. Is it any wonder that the price of structural steel has risen from $39 per ton in January, 1946, to $250 per ton in May, 1948?

The Department of Commerce reports that in the first six months last year industry needed $11 billion to meet higher costs of inventories and replacement of equipment. But it could only find 7½ billions of this in the funds it had set aside for the purpose, plus all the profits it was able to retain. So where did it go to borrow the remaining 3½ billion? It had to go to the country's investors, to the life insurance policy holders, and to savings bank depositors—the same capitalists who are pictured by the soap box orator as fattening on the profits of industry.

So you can see that the 6-cent profit you paid was not enough to meet even the current needs of industry, not to mention the provision for the normal expansion of plant and facilities which must take place if new jobs are to be created and additional goods supplied to an ever-growing population.

Effect of Shorter Hours on Production

McGRAW-HILL WORLD NEWS, Melbourne

There has been a weighted average increase of 4.64 per cent in pro-

THE NEW TYPE AH

* combination MOTOR STARTER for high-voltage motors with

Here is the answer to severe "repeater" duty motor starting—a combination starter for high-voltage motors that assures instant protection . . . that stands up to millions of start-stop operations with minimum maintenance!

Gives Years of Tough, Repetitive Service

New, longer life operation, new freedom from maintenance is made possible by the heavy-duty Westinghouse Air-Break Contactor. Because it operates in air instead of oil, the new Type AH Contactor increases contact life . . . reduces maintenance to routine checkups. Rating: 5000 volts maximum.

Limits Fault Currents in .002 seconds

Fast-acting Type BAL Fuses protect the circuit against faults beyond the interrupting capacity of the contactor . . . limit fault currents in ⅛ cycle . . . completely clear them in ½ cycle. Interrupting capacity: 150,000 kva at 2300 volts; or 250,000 kva at 4160 volts, 3 phase, 60 cycles.

Installs Fast and Easy

One all-welded steel cabinet houses the starter and circuit protective components. On-the-job wiring is limited to making connection to line and motor. Standardized cabinets make attractive single or group installations and simplify future addition of control units.

Get the complete facts. Contact your nearby Westinghouse representative today or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60661

Send for bulletin B4023

Westinghouse Combination Starter with the Air-Break Contactor

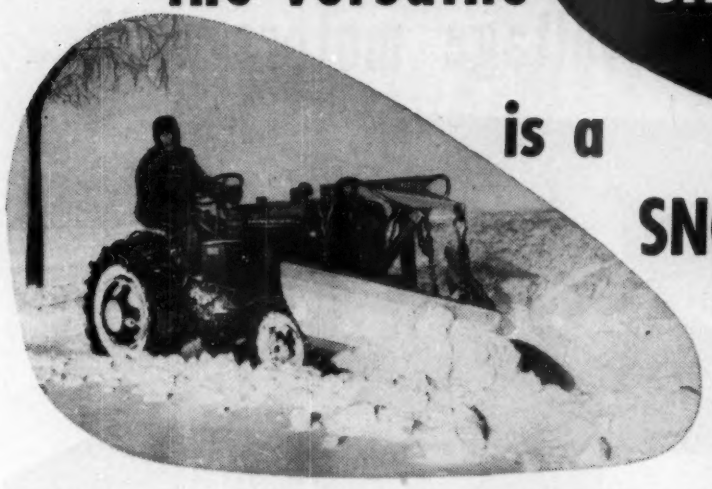
- **New, longer life, heavy-duty Air-Break Contactor**
- **Millions of trouble-free operations**
- **Maintenance minimized . . . contact life extended . . . no oil to check or replace**
- **Exclusive arc interrupter design eliminates continuous blowout-coil losses**

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Industrial Controls

the versatile SHOP MULE is a SNOW PLOW—too!



Get *extra* use from versatile Shop Mules during winter! Two easily mounted snow plow attachments, the V-type pictured and the reversible straight blade fit all Shop Mule models except the 3-wheel model. Will clear a path 5 feet wide *quickly*, saving valuable time.

Just one of the many reasons why International Harvester powered Shop Mules are preferred in 73 Industrial Fields is that *there are 172 warehouses for Shop Mule parts.* That's why service is so much faster on normal replacements than for any other industrial tractor. Think of the savings in down time alone.

Model F50
SHOP MULIFT

Now is the time to order a snow plow attachment for your present Shop Mule. If you do not, as yet, use a Shop Mule, send for specifications and operating data showing how Shop Mules and Shop Mulifts can help solve *your* problems. Just tear out this ad and mail with your letterhead and name —today!

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SHOP MULE INDUSTRIAL TRACTORS

F.O.S. INDUSTRIAL TAPE
(FRICTION ONE SIDE)

REDUCE PRODUCTION COSTS—F.O.S. Tape is handy, versatile, inexpensive. Simplifies production in *many* ways . . . Stays put—but can be removed quickly without requiring "cleanup." Let SEAMLESS analysts show you how to save time and money with F.O.S. No obligation! . . . *Write today for samples and prices.*

FINEST QUALITY SINCE 1877

SEAMLESS REG. U. S. PAT. OFF.

INDUSTRIAL TAPE DIVISION
THE SEAMLESS RUBBER COMPANY
NEW HAVEN 3, CONN., U. S. A.

ductivity per man-hour since Australia shortened the working week from 44 to 40 hours early this year. But since the reduction in hours worked represents a loss of 9.09 per cent in potential production, there is a theoretical net loss in gross output of about 4.8 per cent.

Actually, the loss in gross production is much higher—9.28 per cent—caused by greater absenteeism since the introduction of the 40-hour week. These facts are stated in a report by the Commonwealth Tariff Board. The report cautions, however, that the investigations do not cover a long enough period to be unconditionally valid.

Colin Clark, Australian authority on productivity, warned two years ago that experiences in the United States and elsewhere with shorter hours were not conclusive. When the working week was shortened in the United States in 1933, the real product per man-hour was low owing to dislocations caused by the depression. In France, also, real product per man-hour was abnormally low in 1936 when hours were shortened. However, in New Zealand the evidence was more favorable to a case of reduction of hours. The introduction of the 40-hour week definitely raised real product per man-hour, though not fully in proportion to the reduction in hours.

GE Ordered to Cancel Recognition of UE

General Electric Company was recently directed by the Atomic Energy Commission to withdraw and withhold recognition from the United Electrical Workers-CIO, in respect to any employees engaged on atomic work of a restricted nature.

This was the commission's second action, after a warning, against UE because its officers had not submitted to loyalty tests.

The commission based its action on "alleged Communist affiliation or association of various officers of UE" and because their positions "are such that they exercise administrative, negotiating, or disciplinary authority within the union" over GE employees.

The commission's first order barred the union from representing workers at any new atomic plants operated by General Electric.

The union responded almost immediately by reminding GE that the national agreement between General Electric Company and UE is legally in force and in effect until at least April, 1950. The union further warned that GE's legal obligation to comply with this contract and to abide by all its provisions can in no way be affected by the order of the Atomic Energy Commission.

A Lever Type Aro Tapper on re-tapping operation—suspended from an Aro Balancer.

New ARO *Push-Pull Tappers*

★ AUTOMATICALLY REVERSIBLE

★ FULL SPEED RANGE

★ IDEAL FOR ALL TAPPING, RE-TAPPING

INCREASES OUTPUT... REDUCES COST!

Speed up tapping and re-tapping operations . . . cut down costs . . . with the new ARO Push-Pull Tappers! Automatically reversible —push for forward . . . pull for reverse. Twelve new models in wide speed range—450—750—1100—2500 r.p.m. Capacity 450 r.p.m. ¼″ tap in ⅛″ sheet steel. Re-tapping, chasing and cleaning up to ⅜″.

Designed with *higher torque,* provided by a secondary planetary gear system supplementing Aro's famous "O" Series motor . . . *variable speeds* for maximum efficiency in an unlimited field of metals . . . *simplified tap changing and adjusting* by means of new type Jacobs tap chuck . . . *trouble-free reversing mechanism* . . . Aro-built dependability. See your Aro Jobber or send coupon for new bulletin.

ARO

AIR TOOLS

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Without obligation, send us your illustrated bulletin on the new Aro Push-Pull Tappers.

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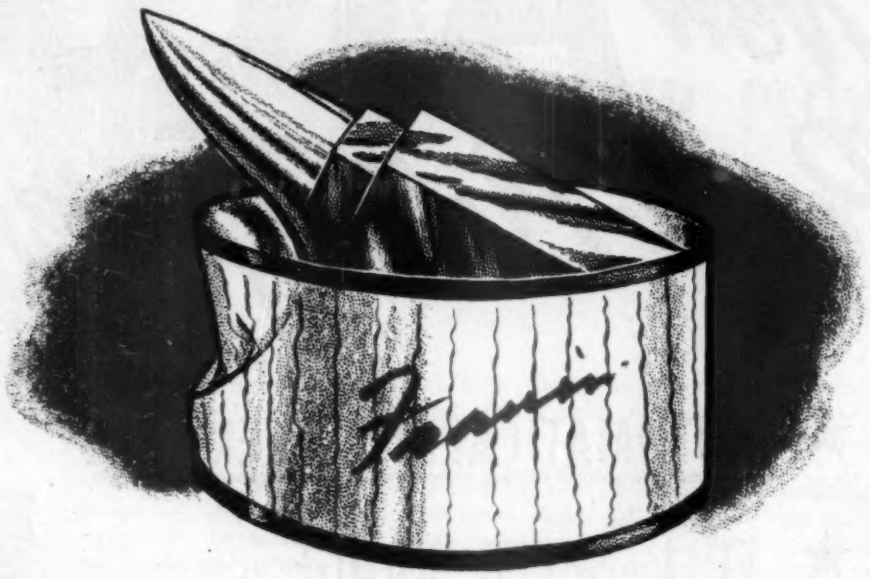
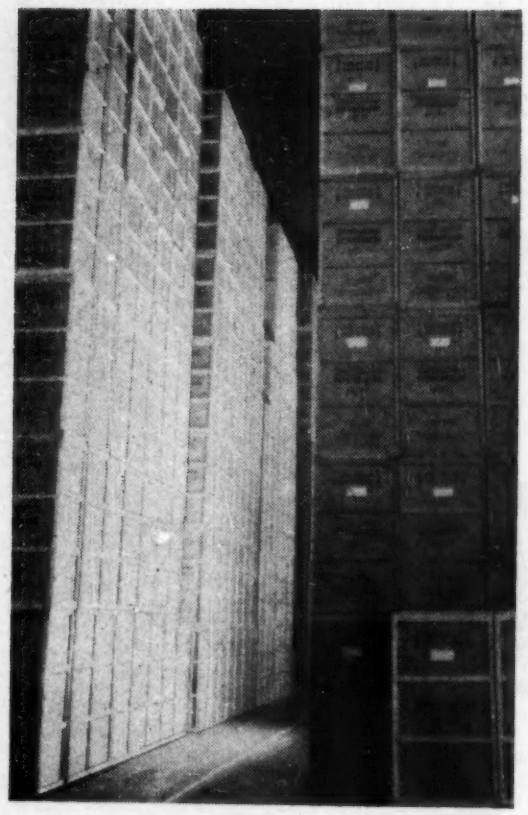
YOU WOULDN'T TRY to SHIP AN ANVIL IN A HAT BOX





YET many manufacturers who take pride in building a fine product miss the boat completely when it comes to specifying the proper shipping container.

SARANAC *stapled* Packages reduce costly delays and loss of customer good-will caused by damaged shipments resulting from improperly designed and poorly constructed containers.

Consult one of the suppliers listed below. Packaging is his business. You can bank on his recommendations. Ask *him* about SARANAC *stapled* packages.

MANUFACTURERS

ATLAS PLYWOOD CORP.
Boston, Mass.
GENERAL BOX CO.
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Philadelphia, Pa.
BRISCOE BOX CO.
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MENASHA WOODENWARE CORP.
Menasha, Wis.
PACKING MATERIALS CO.
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BIRD & SON
E. Walpole, Mass.
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INTERSTATE VENEER CO.
Emporia, Va.

SARANAC MACHINE CO.
BENTON HARBOR, • MICHIGAN

BEHIND THE BYLINE

Facts About *Factory's* Authors

C. Lee Dryden (page 95), president of the Dryden-Harlan Electric Company, has a varied background of business experience. In 1925 he was district supervisor of plant engineering with the Michigan Bell Telephone Company, from 1931 to 1936, division engineer of a metropolitan water district in California, then an instructor at the Henry Ford Trade School in Detroit. He has been works manager of Budd .Induction Heating, chief plant engineer at American Propeller Corporation, chief of staff at the Dodge Chicago Corporation, chief plant engineer at Signode Steel Strapping, manager of engineering at Marathon Corporation. He is a licensed private pilot, and flies his own plane.

W. C. Van Cleaf (page 106) has been with Allis-Chalmers more than 36 years. He was first an electrical apprentice, then successively foreman of the electrical test floor, supervisor of apprentices, employment supervisor, personnel supervisor, assistant to the vice-president in charge of industrial relations, and director of industrial relations—his present position. Van Cleaf served as a member of the Mayor's Committee on Inter-Racial Relations, and was a charter member of the Wisconsin Industrial Commission's Advisory Committee on Apprentices and the Veterans' Rehabilitation Committee for the Association of Commerce. He also belongs to SAM, Industrial Relations Association of Wisconsin, AMA, Milwaukee's Employers' Association, and the Allis-Chalmers Foremen's Club.

Royce M. Covert (page 108) has been with Westinghouse since 1935, first as foreman of transportation stores in Newark, then general foreman of production in the Canton Ordnance Division. In 1946 he was made staff

If the job calls for Drier Rolls..

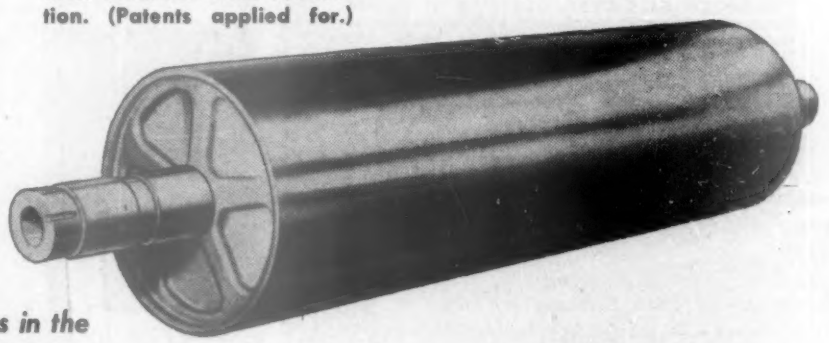
Hundreds* of Lukenweld Jacketed Steel Drier Rolls are doing it *better, faster and safer*

Over 14 years' experience on drying problems goes into Lukenweld's engineering of rolls and machines for drying. In scores of plants, hundreds of Lukenweld Jacketed Steel Drier Rolls in service today demonstrate these advantages: *Higher quality products*—surface temperatures are more uniform and constant. *Faster production*—positive scavenging of steam passages flushes out air and condensate, assuring high efficiency. *Greater safety*—welded steel plate construction permits high steam pressures. *Simplicity of construction*—nothing to get out of order; can be designed without bolts, nuts, or siphons to work loose in service.

Any diameter, 24 inches or 18 feet—lengths to suit each task—plain steel, polished or plated surfaces, or any of the Lukens corrosion-resistant clad steels; we design drier rolls to meet your exact requirements. Lukenweld also designs and builds additions to existing drying equipment or completely new machines.

Bulletin 358 tells about Lukenweld Jacketed Drier Rolls. For a copy, write Lukenweld, Division of Lukens Steel Company, 421 Lukens Building, Coatesville, Pa.

Employ Lukenweld Jacketed Drier Rolls for More Production. (Patents applied for.)



*In service in scores of plants on drying operations in the paper, chemical, drug, food, plastic and other industries.

LUKENS
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DESIGNERS, ENGINEERS AND MANUFACTURERS OF MACHINERY

• • SPEED SCRAP TO THE MILLS TO MAKE MORE STEEL • •

CUT YOUR COSTS up to 30%

Lamson Conveyors in Action
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LAMSON
CONVEYORS

SAVE wasted effort . . . handling time . . . and floor space.

SPEED flow of materials for greater production.

• It's a fact. Materials-handling costs actually eat up to 30% of your manufacturing dollar. *And — there's nothing to show for it in your finished product.*

• That — for management — is a tough headache.

• *But this is also an incontrovertible fact.* Lamson Conveyors have drastically cut materials-handling costs in thousands of plants. (The Westinghouse Plant above is only one.) They can do the same for you.

For Greater Savings—
LAMSON Pneumatic Tubes

• Coordinate flow of papers with the flow of materials on Lamson Conveyors. Save costly messenger service . . . speed flow of mail, telegrams, requisitions, small tools, samples, and blueprints.

In One Plant Alone
LAMSON TUBES Saved
$150,000 in one year

The ALLEN-BILLMYRE DIVISION of Lamson Corporation supplies single and multistage blowers and exhausters for all industrial uses. ½ to 200 HP; ¼ to 8 lbs. Pressure, 25 to 15,000 C.F.M.

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Company.....
Address.....
City..... Zone..... State.....
My name.....

supervisor of production. He is a veteran of World War I, enjoys as hobbies bridge and golf.

J. R. DeHaven (page 112), assistant secretary and supervisor of the Employers Mutual Fire Insurance Company, started in that company's Missouri Inspection Bureau in Kansas City in 1935. By some military miracle, when he went into World War II he was actually assigned to work as a fire inspector, and put in two years in England, Scotland, and Wales. On his return from service, he went back to his former job as a fire company engineer in Minneapolis, but was transferred to the home office in Wausau, Wis., in 1946.

Edward D. Kemble (page 114) has spent his entire career in the production phases of metals fabricating and manufacturing. A native of Cleveland, he graduated in 1928 from the Case School of Applied Science as a mechanical engineer. His first job was with the Delco-Remy Division of General Motors as an apprentice in the production department. During the war years he worked with Cleveland Automotive Machinery Corporation, and in 1945, joined Clark Equipment Company, where he is now plant manager of the industrial truck division.

Eugene M. Marchand (page 120) was born in Meriden, Conn. After one year as a draftsman with the Connecticut Telephone & Electric Company, he joined the New Departure Division of General Motors as draftsman in the plant engineering department. He was made chief draftsman, then assistant plant engineer, then superintendent of power, heat, and light, and, finally, plant engineer of the Sandusky division, his present post.

MIPRO WALL TYPE SANITARY NAPKIN DISPOSAL

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BE MODERN . . .

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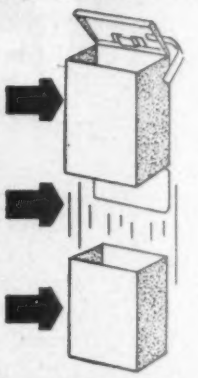

Mipro Disposal eliminates all unpleasant features of Standard Soiled Sanitary Napkin receptacles.

Liner protects metal container and keeps it clean. Simply open bottom trap door and used liner and contents drop out into collection basket.

HANDS NEVER TOUCH USED LINER

WRITE FOR FULL INFORMATION TO

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Before you specify
ANY MOTOR, *check*
these VALLEY
ADVANTAGES

✔ Wide Adaptability —sizes ½ to 75 h. p.
✔ More Flexibility in power planning
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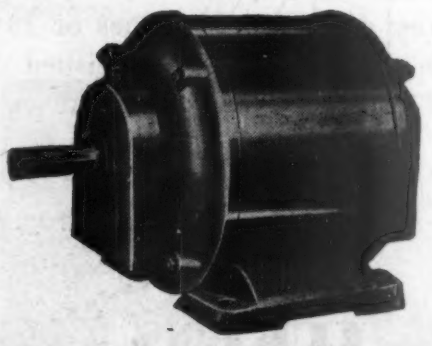
✔ BALL BEARING



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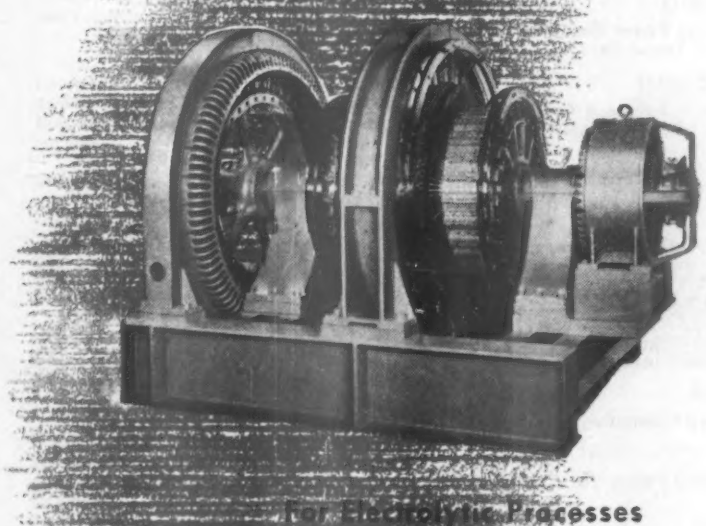

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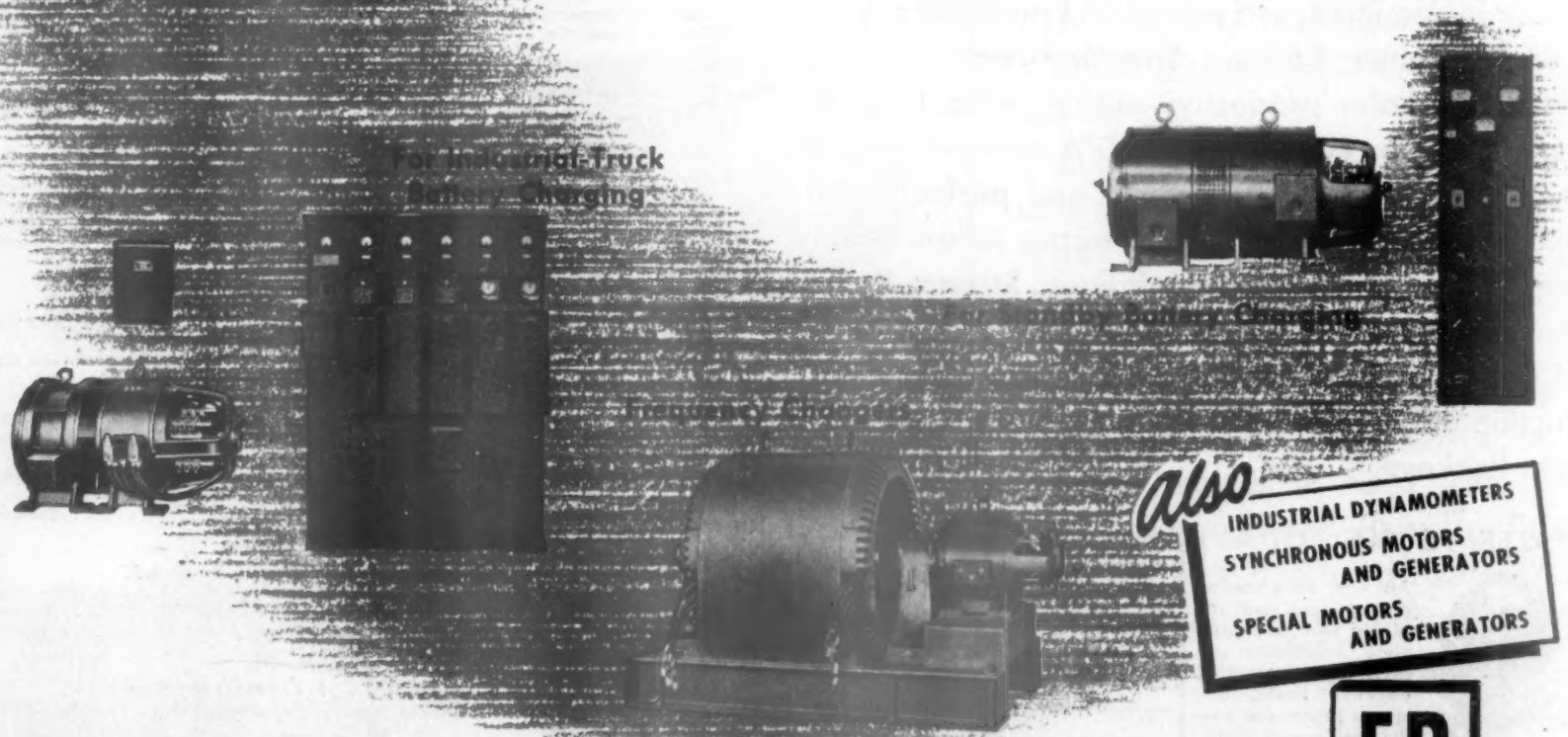

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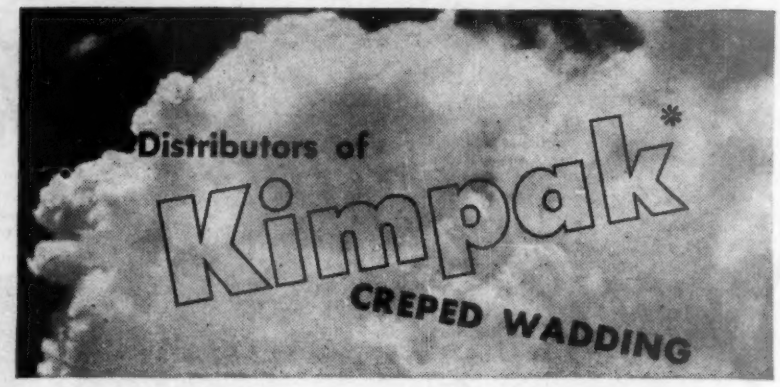

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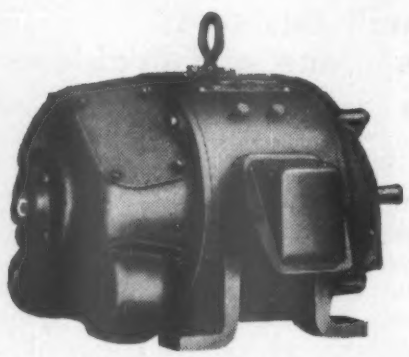

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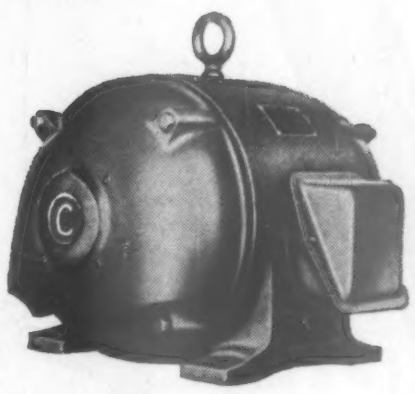

1 to 30 HP Squirrel Cage Induction 3 Phase Splash Proof Motors

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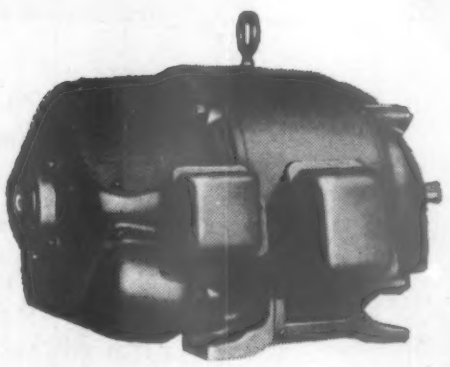
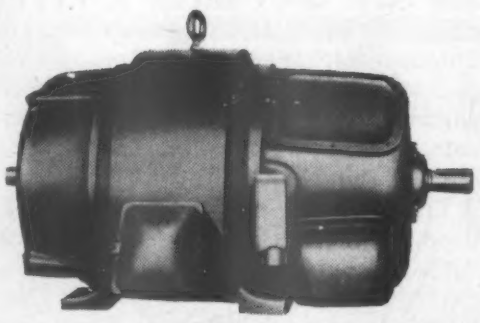
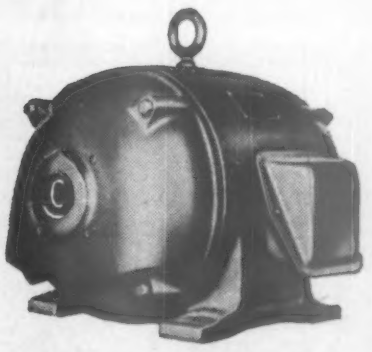


3 to 25 HP Slip Ring Induction 3 Phase Splash Proof Motors



30 to 100 HP Slip Ring Induction 3 Phase Splash Proof Motors



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Editor-in-Chief, **GEORGE T. TRUNDLE, Jr.** John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. 408 pages. Charts, tables, graphs, formulas, layouts, index. $5.

Prepared by the staff of Trundle Engineering Company, book stresses principles and methods used by business and industry today. It first reviews the general problems of management, then discusses particular aspects of sales management, manufacturing, and industrial relations. Some of the individual topics analyzed are budgetary and cost control, engineering and research, pricing procedures, job evaluation, market studies, executive organization, plant layout and maintenance, production, quality and expense control, labor compensation, and others.

Small Business: Its Place and Problems

A. D. H. KAPLAN. McGraw-Hill Book Co., 330 West 42nd St., New York 18, N Y. 281 pages. Tables, charts, graphs, appendix, index. $3.25.

A Research Study made by the Research & Policy Committee of the Committee for Economic Development. It takes up, first, the question, "Why the concern for a small business?" then discusses a definition of small business, the pre-war and post-war patterns. Vital Statistics of Small Enterprise is another chapter, Relative Efficiency of Small Business, Meeting Financial Requirements, Competition — Means and Ends, and Education and Public Policy are others.

Training Employees and Managers for Production and Team Work

EARL G. PLANTY, Ph.D., Executive Counselor, Johnson & Johnson, **WILLIAM S. McCORD,** M.A., Director, Industrial Relations, Personal Products Corp., and **CARLOS A. EFFERSON,** Ph.D., Staff Training Director, Chicopee Mfg. Corp. The Ronald Press Co., 15 East 26th St., New York 10. 278 pages. Photographs, tables, charts, lists, typical diplomas and certificates, bibliography, index. $5.

The authors of this volume have used as a basis of their material actual experiences in the training departments of the companies with which they are affiliated. They show how training may be used as a means of solving problems of labor-management relations and plant efficiency, by improving the skills and attitudes of both employees and

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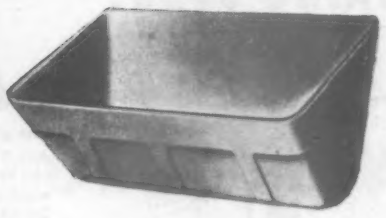

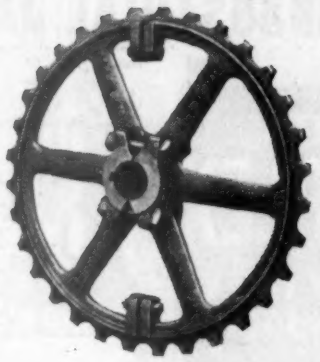

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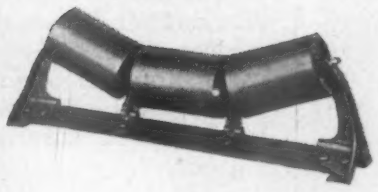

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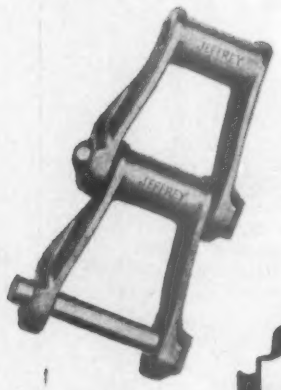

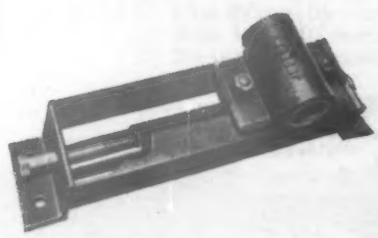

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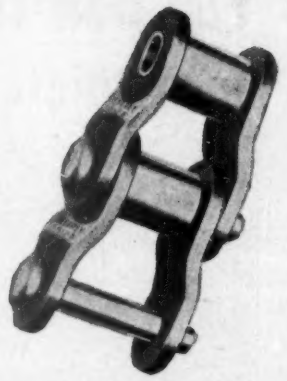

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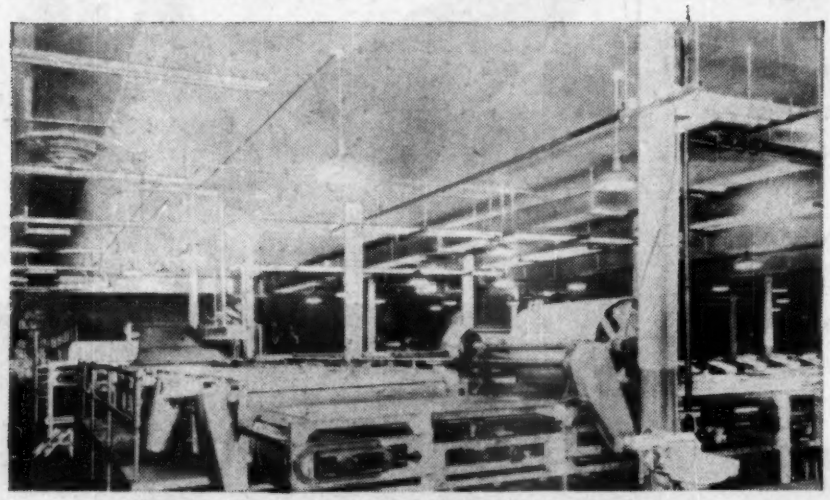

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BLANCHE H. DALTON, Engineering Librarian, University of California. University of California Press, Berkeley, Calif. 109 pages. $4.

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HARRY J. McCAULLY, Jr., Assistant Works Manager, International Resistance Co. Funk & Wagnalls Co., 153 E. 24th St., New York 10. 213 pages. Tables, charts, graphs, specimen forms, index. $2.65.

Manual of over-all manufacturing controls, including production, material, purchasing, industrial engineering, quality, financial, and budget controls, with actual examples. It presents a new approach to the training of foremen and supervisors, reporting specific examples of basic training programs. Ninety basic principles for the operation of an industrial enterprise and a checklist of duties and responsibilities of a foreman are also included.

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JOHN MARKUS and **VIN ZELUFF,** Associate Editors of *Electronics.* McGraw-Hill Book Co., 330 W. 42nd St., New York 18. 272 pages. Diagrams, index. $7.50.

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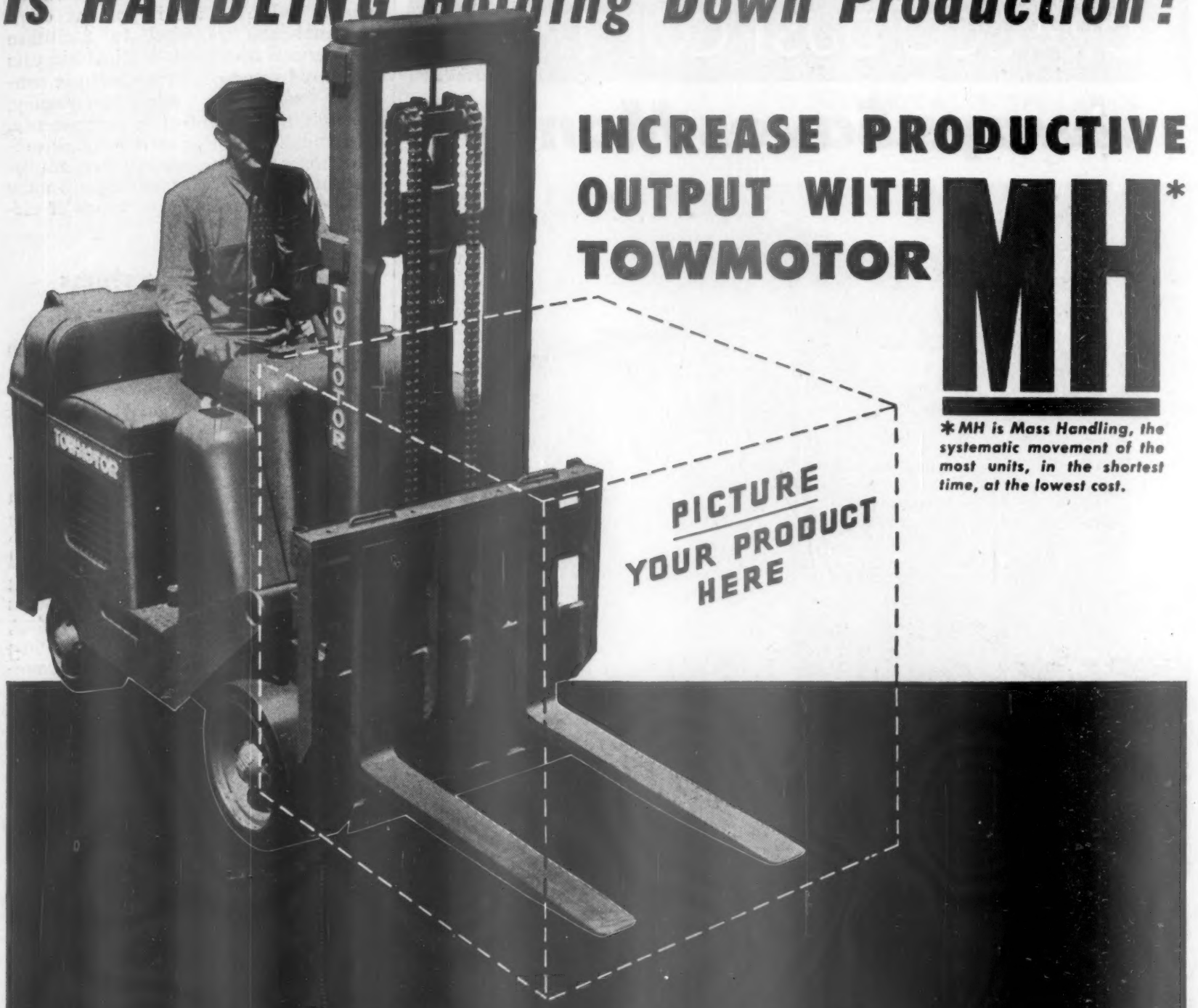

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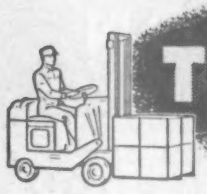

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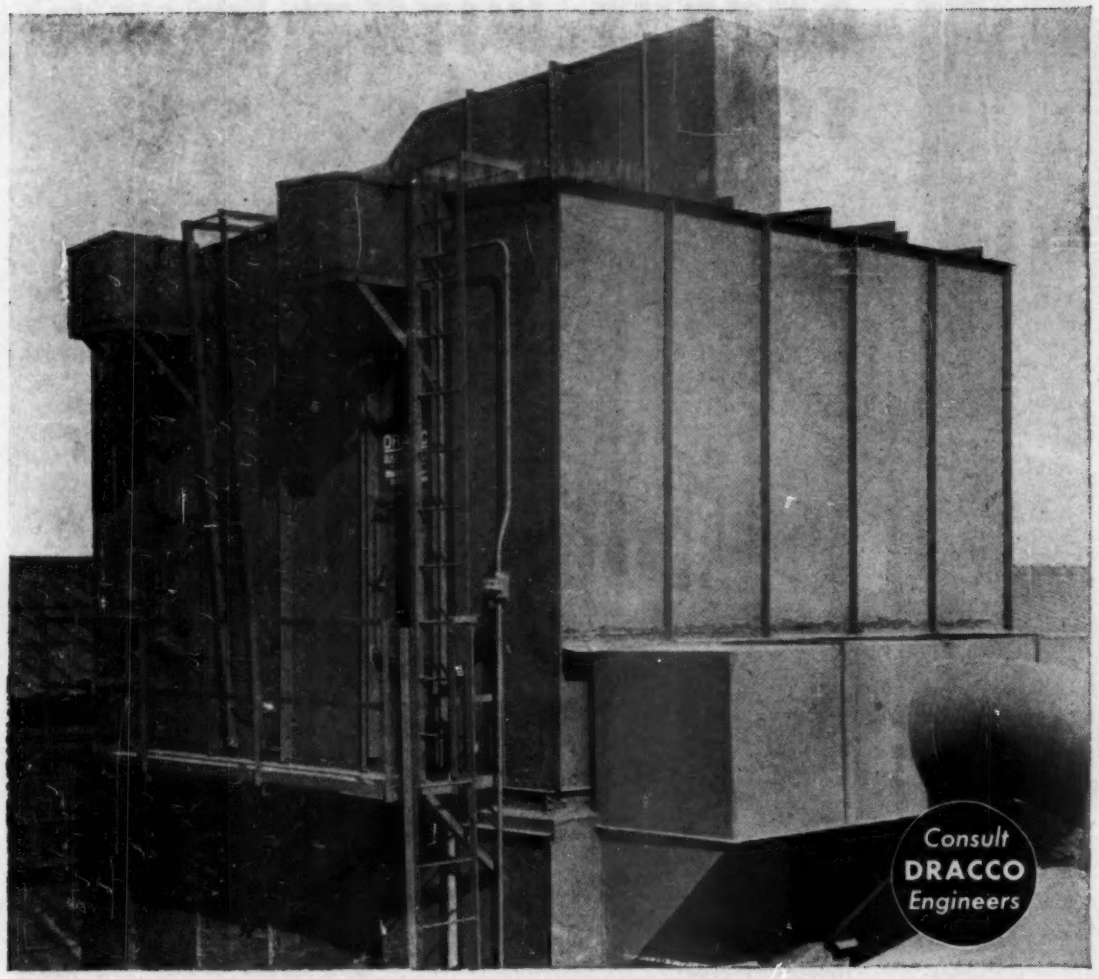

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BOOKLETS

CAUSES OF INDUSTRIAL PEACE UNDER COLLECTIVE BARGAINING. Frederick H. Harbison and King Carr, both of the Industrial Relations Center, University of Chicago. Case Study No. 2, based on 15 years of industrial relations between the Libbey-Owens-Ford Glass Co. and the Federation of Glass, Ceramic, & Silica Sand Workers of America. National Planning Association, 800 - 21st St., N. W., Washington 6, D. C. 64 pages. $1.

COMPANY WAGE POLICIES. A survey of patterns and experiences. Richard A. Lester, Research Associate, Industrial Relations Section. Department of Economics and Social Institutions, Princeton University, Princeton, N. J. 46 pages. $1.50.

GLOSSARY OF PACKAGING TERMS. Compiled by Gerry O. Manypenny, Chairman, Packaging Glossary Sub-Committee, Standards & Practices Committee. Packaging Institute, Inc., 342 Madison Ave., New York 17. 188 pages. $1.75 to members, $2.75 to non-members.

DISCHARGE FOR CAUSE. A study of arbitration awards in cases of the New York State Board of Mediation, 1937-1946. Myron Gollub. Division of Research and Statistics, New York State Department of Labor, 80 Center St., New York 13. 88 pages. 70¢.

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DISTRICT OFFICES AND PLANTS: Brooklyn, Cincinnati, Detroit, East St. Louis, Kansas City, Louisville, Milwaukee, New Orleans, Sheboygan, Winchendon, Natchez. Continental Box Company, Inc.: Houston, Dallas.

General Nailed Box

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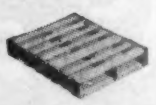

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DEPRECIATION POLICY AND THE POSTWAR PRICE LEVEL. Machinery and Allied Products Institute, 120 S. La Salle St., Chicago 3. 27 pages. 25¢.

CAPITAL GOODS INDUSTRIES AND TAX REFORM. George Terborgh, Research Director. Machinery & Allied Products Institute, 120 South La Salle St., Chicago 3. 40 pages. 25¢.

YOUR GUIDE TO THE SAFE CARE AND USE OF FIBRE ROPE. Association of Casualty & Surety Companies, 60 John St., New York 7. 12 pages. Tables, sketches. Copies available through member companies.

NEMA STANDARDS FOR SHAFT COUPLINGS. American Standard integrally forged flange-type shaft couplings for hydro-electric units, B49.1—1947. National Electrical Manufacturers Association, 155 East 44th St., New York 17. 12 pages. 45¢.

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METHODS MANUAL. A technique for the selection, training, and counseling of personnel. Keith Van Allyn. Surveys, Inc., 651 Waverly St., Palo Alto, Calif. 128 pages. Sample forms, lists, profiles, charts. $7.50.

OPERATING UNDER THE TAFT-HARTLEY ACT. A practical explanation of how the new law works, revised edition. Max Malin and S. Herbert Unterberger. Labor Relations Information Bureau, Standard Oil Bldg., Washington 1, D. C. 58 pages. Time tables of dates, complete text of Act. $2.

THE PREVALENCE OF INCENTIVE WAGES IN WISCONSIN. A report of a questionnaire survey of Wisconsin manufacturers. Wm. H. Mayer, and Wm. H. Keown, Research Assistants. Univeristy of Wisconsin, School of Commerce, Bureau of Business Research & Service, Madison 6, Wis. 41 pages. Maps, tables, graphs, appendix (sample questionnaire). $1.10.

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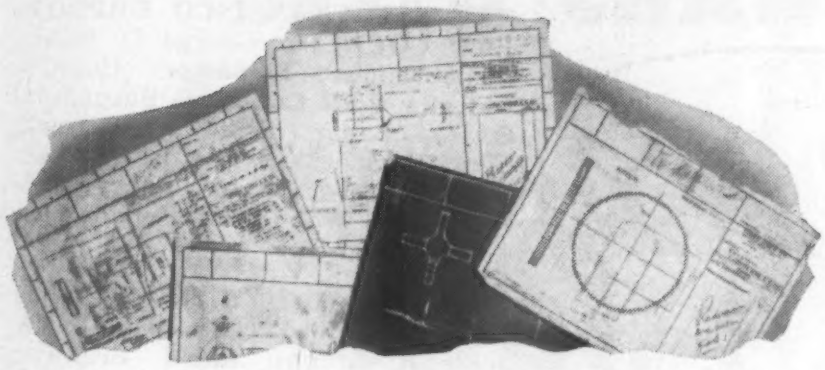

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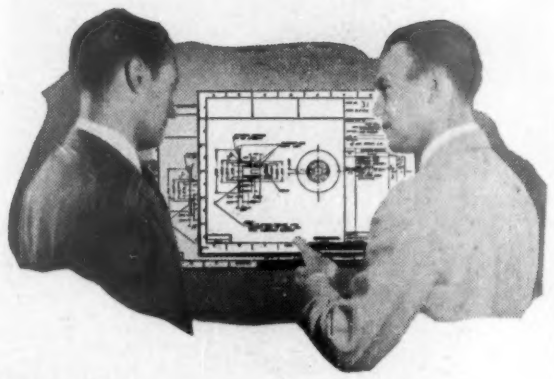

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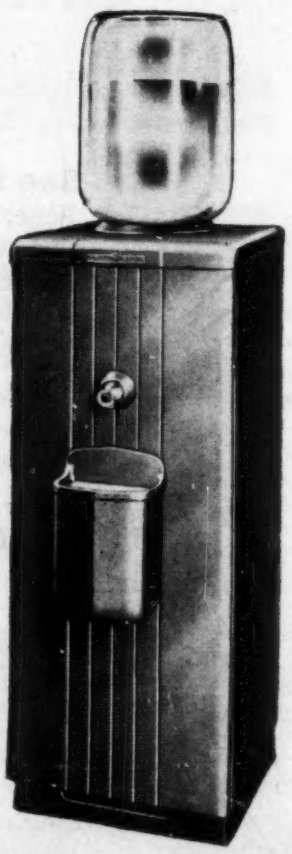

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NEW DIRECTIONS IN SALES MANAGEMENT, MARKETING, AND PACKAGING. A check list of significant AMA publications. American Management Association, 330 West 42nd St., New York 18. 8 pages. No charge.

THE SAN FRANCISCO EMPLOYERS' COUNCIL. George O. Bahrs, San Francisco Employers' Council. Industry-Wide Collective Bargaining Series, Labor Relations Council, Wharton School of Finance & Commerce. University of Pennsylvania Press, 3436 Walnut St., Philadelphia 4. 39 pages. 75¢.

INDUSTRIAL TRAINING — A GUIDE TO SELECTED READINGS. John M. Brophy and I. Bradford Shaw. Extension Bulletin No. 1. New York State School of Industrial & Labor Relations, Cornell University, Ithaca, N. Y. 32 pages. Authors index, publisher's data on books and pamphlets. Single copies free to residents of New York State; bulk orders (over 5) and out-of-state orders, 10¢ each.

THE JOINT SAFETY PROGRAM OF THE FORSTMANN WOOLEN COMPANY AND LOCAL 656, TEXTILE WORKERS UNION OF AMERICA-CIO. Richard H. Wood, In Charge of Research, and John J. Pearce, Jr., Research Assistant. Case Studies of Cooperation Between Labor and Management: No. 1. Rutgers University, State University of New Jersey, Institute of Management and Labor Relations, 77 Hamilton St., New Brunswick, N. J. 47 pages. Appendixes I, II. 40¢.

YOUR GUIDE TO SAFETY IN THE PLUMBING, HEATING, AND VENTILATING TRADES. Accident Prevention Dept., Association of Casualty & Surety Cos., 60 John St., New York 7. 17 pages. Tables, sketch. No charge; copies available through member companies of the Association.

THE NEW CURE FOR WHITE COLLAR UNREST. Prentice-Hall, Inc., 70 Fifth Ave., New York 11. 48 pages. Specimen reports, forms, questionnaires. $1.

MANUAL OF REPORT PREPARATION. Correspondence and Technical Writing. Frank Kerekes, Assistant Dean of Engineering, and Robley Winfrey, Professor of Civil Engineering, Iowa State College. Wm. C. Brown Co., Dubuque, Ia. 397 looseleaf pages. Diagrams; sketches; specimen charts, graphs, letters, reports, floor plans; proofreading marks; appendixes A, B, C. $6.

ARBITRATION: BARGAINING FOR YOUR CLAUSE. Jules Justin. Reprinted from *Personnel*, Vol. 24, No. 1. American Management Association, 330 West 42nd St., New York 18. 12 pages. 25¢.

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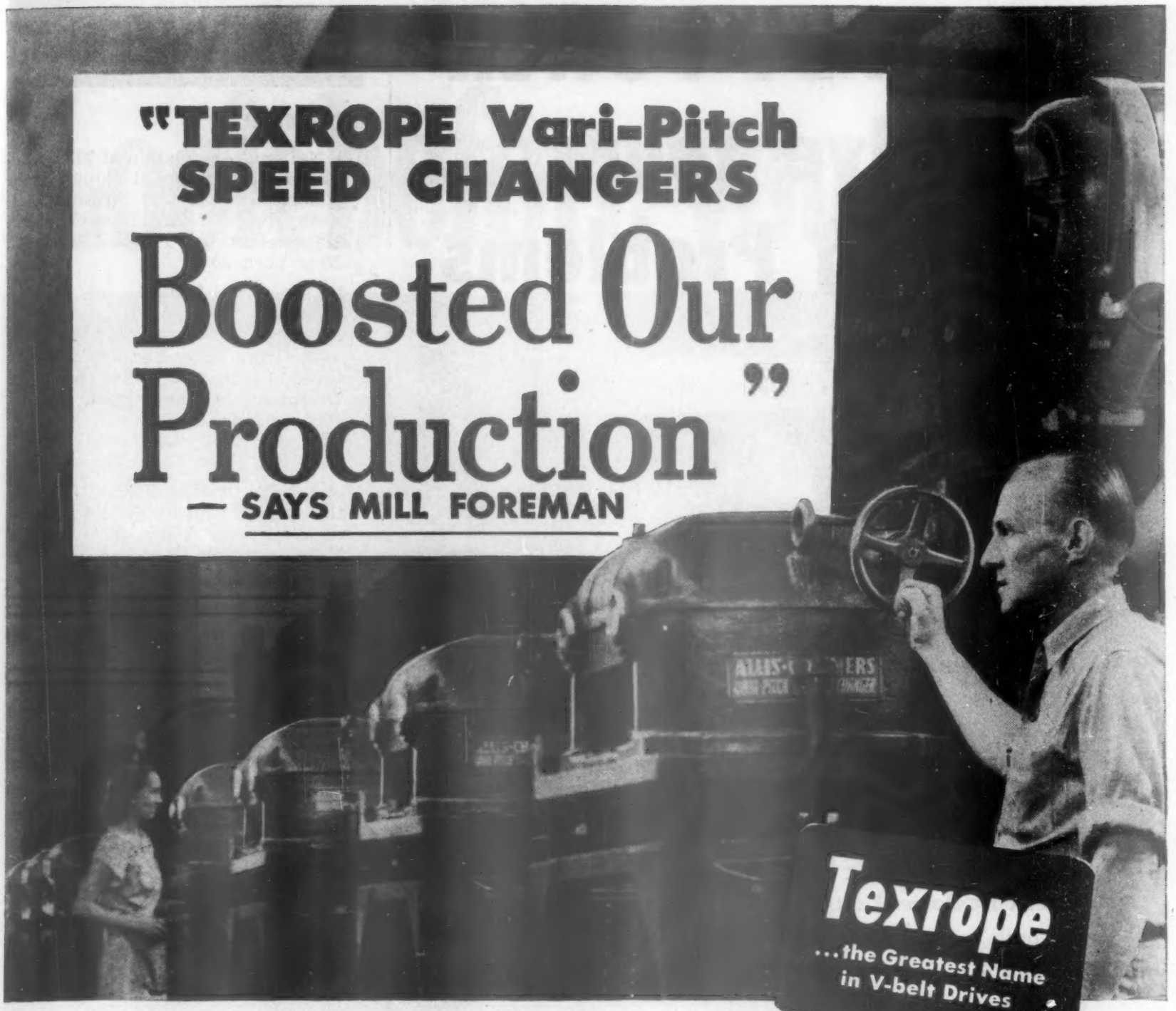

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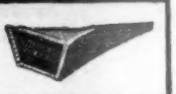
5 types . . . sizes to suit every power transmission job	
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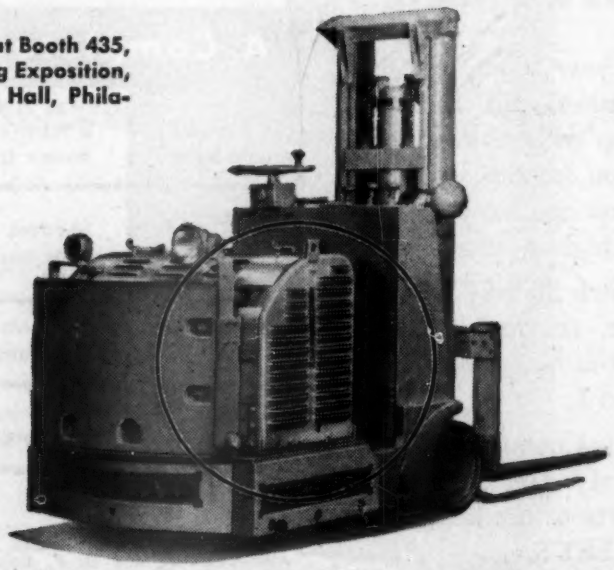

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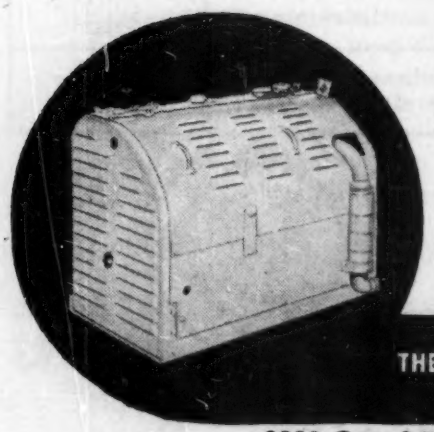

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ON THE CALENDAR

DECEMBER

1-3, National Association of Manufacturers, 53rd National Congress of American Industry; Waldorf-Astoria, New York. Lawrence D. Marks, Director, 14 West 49th St., New York 20.

2-4, American Institute of Mining Engineers and American Society of Mechanical Engineers, 6th Annual Conference, Electric Furnace Steel Committee, Iron & Steel Division; William Penn Hotel, Philadelphia. Dr. Ernest Kirkendall, Assistant Secretary, 33 West 39th St., New York 18.

3, American Leather Belting Association, Annual Meeting; Hotel Commodore, New York. E. R. Rath, Executive Vice-President and Secretary, 63 Park Row, New York.

5-8, American Society of Refrigerating Engineers, Annual Meeting; Hotel Statler, Washington, D.C. M. C. Turpin, Secretary, 40 West 40th St., New York 18.

28-29, American Chemical Society, 15th Annual Chemical Engineering Symposium, Industrial & Engineering Chemistry Division; Massachusetts Institute of Technology, Cambridge, Mass. Dr. Lincoln T. Work, Metal & Thermit Corp., Rahway, N. J.

JANUARY

10-14, Materials Handling Institute, 3rd National Exposition; Convention Hall, Philadelphia. Clapp & Poliak, Inc., Managers, 37 Wall St., New York.

10-14, Society of Automotive Engineers, Annual Meeting; Book-Cadillac Hotel, Detroit. John A. C. Warner, Secretary and General Manager, 29 West 39th St., New York 18.

20-21, American Management Association, Finance Meeting; Hotel Pennsylvania, New York. James O. Rice, Manager, 330 West 42nd St., New York 18.

20-22, The Society for the Advancement of Management, Conference on Industrial Reconversion; Sheraton Hotel, Chicago. Carl S. Coler, Executive Director, 84 William St., New York.

24-28, American Society of Heating and Ventilating Engineers, Annual Meeting; Hotel Stevens, Chicago. A. V. Hutchinson, Secretary, 51 Madison Ave., New York.

24-28, Ninth International Heating and Ventilating Exposition; International Amphitheater, Chicago. Charles F. Roth, Manager, 480 Lexington Ave., New York 17.

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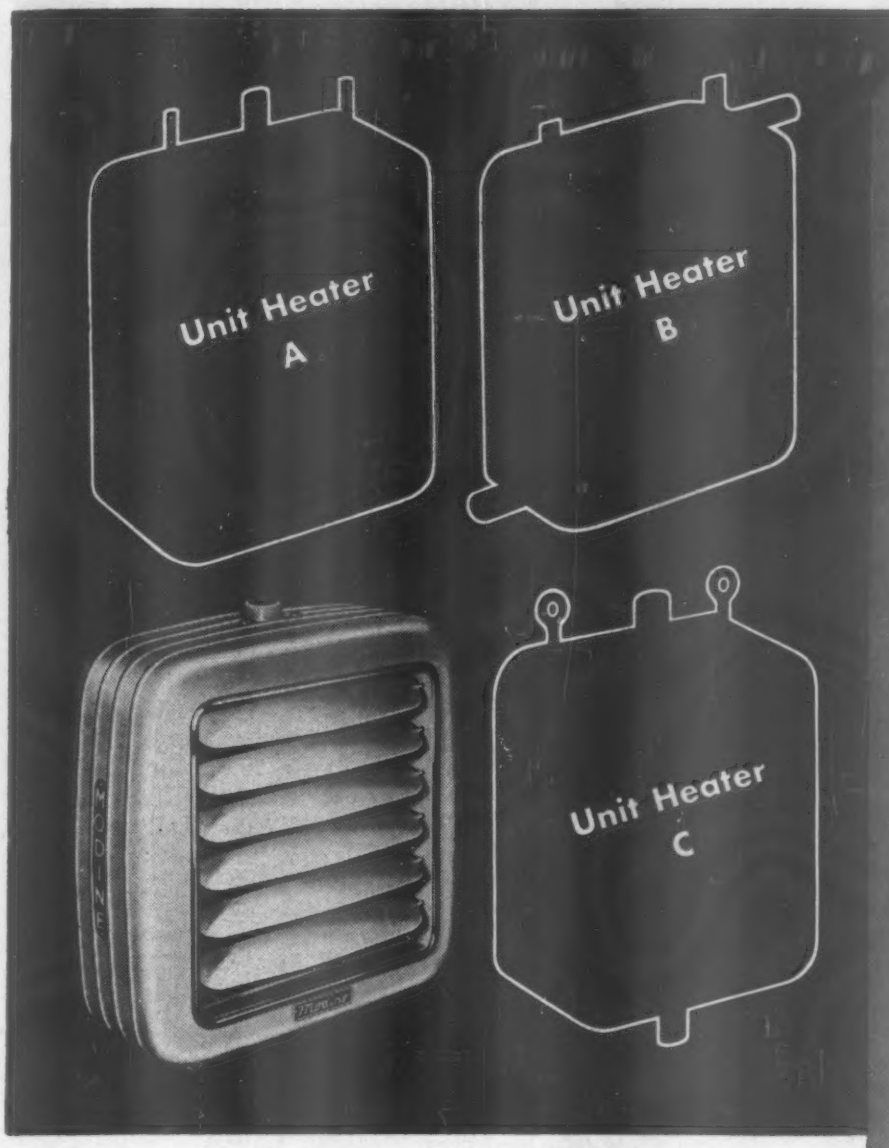

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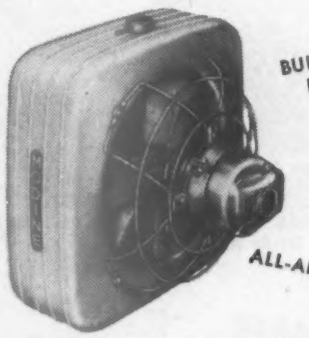

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See how this exclusive Modine feature gives you increased heat-throw without raising motor power requirements. Yes — with Modine you get better heating at no increase in cost.

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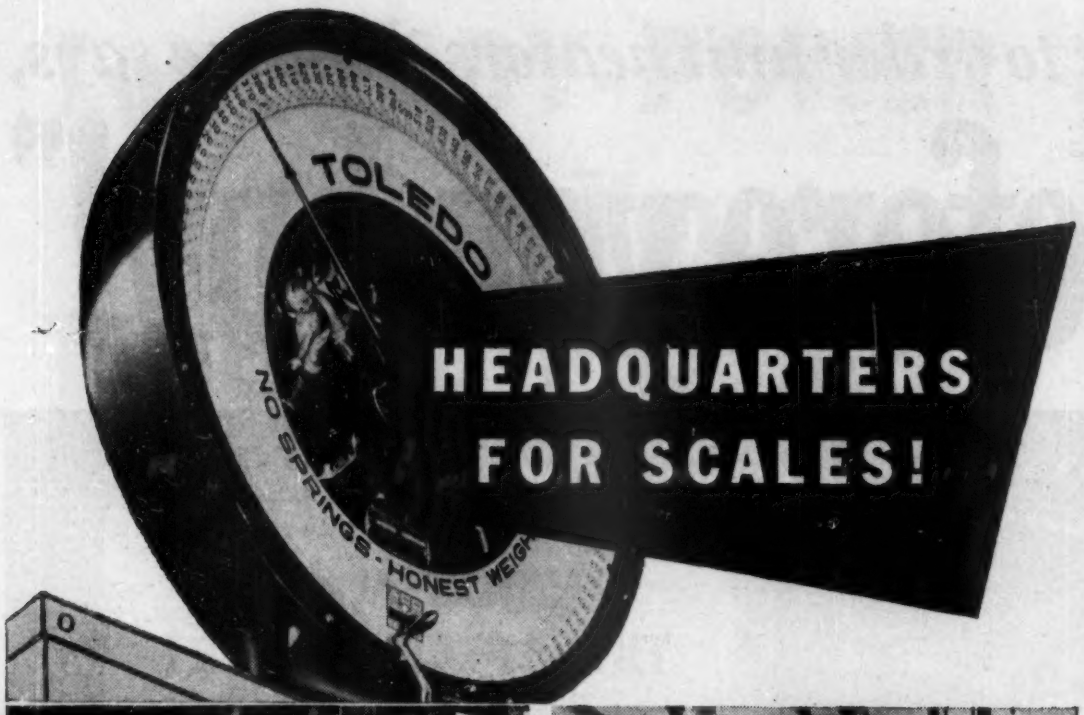

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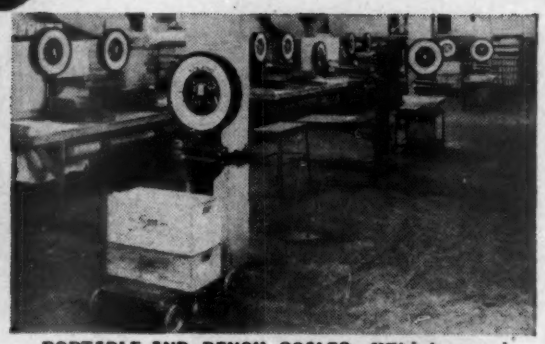

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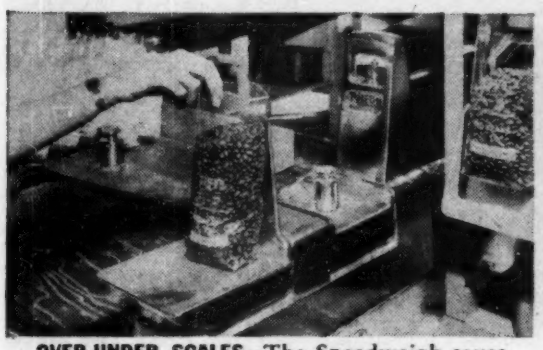

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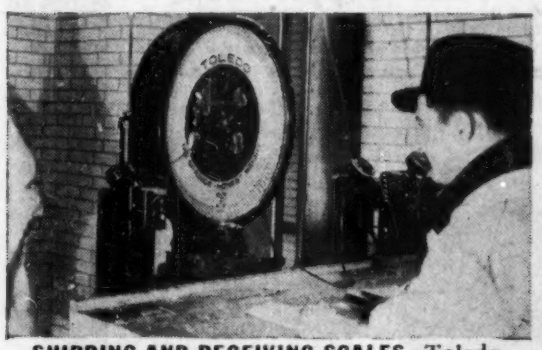

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31-Feb. 4, American Institute of Electrical Engineers, Winter General Meeting; Hotel Pennsylvania. New York. H. H. Henline, Secretary, 29 West 39th St., New York.

FEBRUARY

14-16, American Management Association, Personnel Conference; Drake Hotel, Chicago. James O. Rice, Manager, 330 West 42nd St., New York 18.

28-Mar. 4, American Society for Testing Materials, Spring Meeting; Edgewater Beach Hotel, Chicago. Robert J. Painter, Assistant Secretary, 1916 Race St., Philadelphia 3.

MARCH

3-5, American Society of Training Directors, 5th Annual Meeting; Hotel Carter, Cleveland. F. S. Laffer, General Chairman, Graphite Bronze Co., 17000 St. Clair Ave., Cleveland.

8-10, The Society of Automotive Engineers, Production Clinics; Book-Cadillac Hotel, Detroit. John A. C. Warner, Secretary and General Manager, 29 West 39th St., New York 18.

10-12, American Society of Tool Engineers, Annual Meeting; Hotel William Penn, Pittsburgh. Harry E. Conrad, Executive Secretary, 10700 Puritan Ave., Detroit 21.

13-18, National Electrical Manufacturers' Association, Spring Meeting; Edgewater Beach Hotel, Chicago. R. J. Blais, Convention Manager, 155 East 44th St., New York.

17-18, American Management Association, Conference on Marketing; Hotel Pennsylvania, New York. James O. Rice, Manager, 330 West 42nd St., New York 18.

24-25, Industrial Relations Center, 7th Annual Institute; University of Minnesota, Minneapolis. Herbert G. Heneman, Jr., Chairman, Industrial Relations Center, Minneapolis 14.

27-April 1, American Chemical Society, Spring Meeting; San Francisco. Alden H. Emery, Secretary, 1155 Sixteenth St., N. W., Washington, D. C.

29-April 1, International Lighting Exposition, 3rd International Exposition and Conference; Stevens Hotel, Chicago. B. F. Stevens, 326 West Madison St., Chicago 6.

29-April 1, Safety Engineers, Annual Convention; Hotel Pennsylvania, New York. Paul F. Stricker, Executive Vice-President, Greater N. Y. Safety Council, 60 East 42nd St., New York 17.

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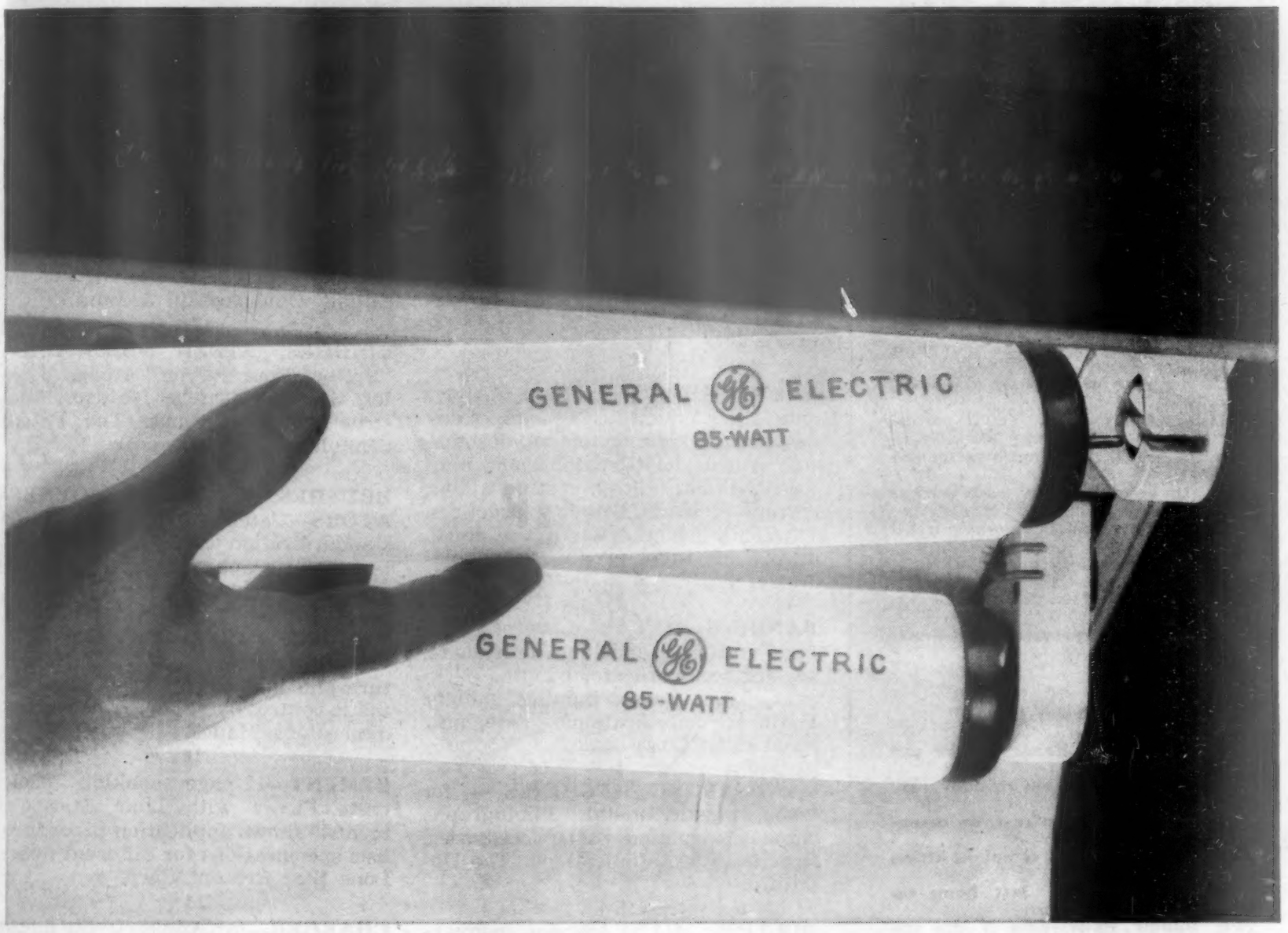

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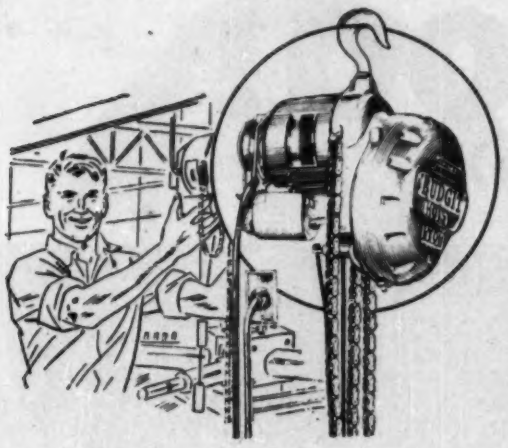

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8
BRUSHES, FOR MOTORS, GENERATORS—Catalog Section B-2106, on standardization of carbon, graphite, and metal-graphite brushes. National Carbon Co., Inc.

9
BURNERS, COMBINATION OIL, GAS—proportioning, for temperature and atmosphere control. Automatic control data, burner capacities, dimensions. Hauck Mfg. Co.

10
CEMENT—12-page booklet, "Concrete Floors with Lone Star Cements," shows application procedure, lists specifications for different floors. Lone Star Cement Corp.

11
CHARGER—for single circuit motor generators, called Charg-O-Matic. Design, controls, construction. Mod-

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...and cuts light aluminum, too

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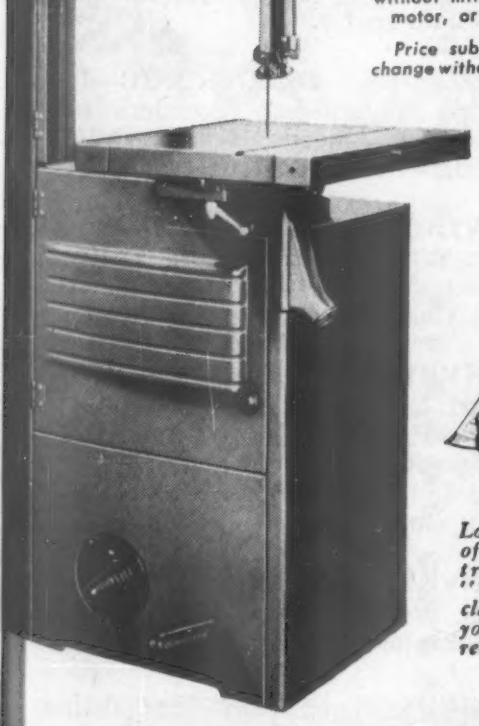

Look for the name of your Delta distributor under "Tools" in the classified section of your telephone directory.

• **Left: The Delta 20" Band Saw handles big wood-cutting jobs.**

• **Below: Trimming aluminum castings with a Delta 20" Band Saw.**

A heavy-duty unit with a name that stands for safety, accuracy, convenience . . .

DELTA® 20" BAND SAW

You can profitably use this big-capacity machine in your pattern shop, maintenance shop, foundry, shipping department, etc. It takes any type of blade in any size up to 1" in width.

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Ball-bearing blade guides provide accuracy and reduce blade breakage.

Welded steel cabinet — a single unit — encloses working parts.

Adjustable "three-point mountings" are used between working parts and welded steel frame, to help your men to easily maintain exact alignment.

Statically-balanced wheels are mounted on sealed-for-life ball bearings.

Aluminum wheels reduce flywheel action after motor is shut off.

Convenient foot brake is provided on lower wheel.

Motor is mounted in base on pivot bracket which automatically provides correct belt tension.

Your nearby Delta distributor would like to show you the Delta 20" Band Saw. See it on his sales-floor soon.

Send coupon for free Bulletin A-28-3.

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ROCKWELL MANUFACTURING COMPANY
MILWAUKEE 1, WISCONSIN
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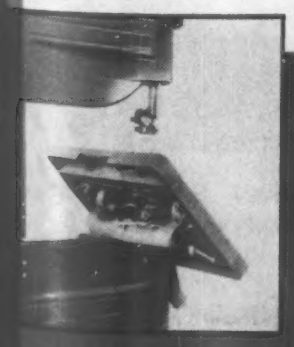
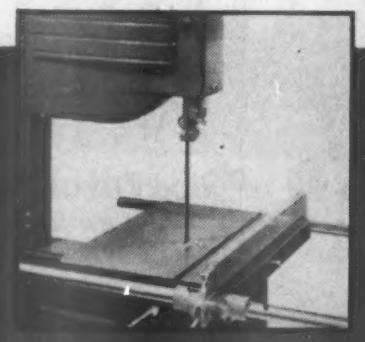
(This tool is also available through Crescent Division dealers.)

...x 24¼" table is rigidly ...orted on two widely-spaced ...ions. Conveniently tilts 45° ...ight; 12° to left.



Heavily-ribbed table is slotted to accommodate miter gage. It is also adaptable to use of a rip fence, as shown.



Ball-bearing blade guides, above and below table, are fitted with micrometer adjustment for precision setting.

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5. Ideal climate and exceptionally favorable working conditions
6. Nevada's tax structure:
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   - No Income Tax
   - No Sales Tax
   - No Tax on Intangibles
7. Unsurpassed transportation facilities and close proximity to water transportation.

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Cordially yours,

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els for lead acid, nickel alkaline batteries. The Hertner Electric Co.

12

CLEANING, STEAM-DETERGENT—"Where and How to Use It," 8-page Service Report, Form 7238R, reviews theory, applications. Oakite Products, Inc.

13

COMPRESSORS, AIR—Series "A" and "D" bare pumps, single and two-stage. Diagrams of different types. Air-Flo Compressor Co.

14

CONCRETE ADMIXTURE—called Trimix. How to use, where to use, 6-page folder BP3017. L. Sonneborn Sons, Inc.

15

CONTAINERS—"The Story Behind the Slogan 'The Container is Part of the Product'," 8-page booklet. Describes types of containers available. General Box Co.

16

CONTROL, PNEUMATIC—24-page Catalog NDRB, replacing N-00B. Characteristics, features, principles involved. Leeds & Northrup Co.

17

CONTROL, TEMPERATURE—Xactline Capacitrol, for indicating, Xactline Capacilog, for recording, used with electrically heated or fuel-fired heating processes. Claud S. Gordon Co.

18

CONTROL, TEMPERATURE—duration-adjusting type; 36-page catalog. For use with electrical or fuel-fired equipment. Also Speedomax controllers, for use where unusual speed and sensitivity are required. Leeds & Northrup Co.

19

CONTROLS, ELECTRONIC—Indicators, controllers, recorders combustion safeguards; 4-page Bulletin Z6500. Wheelco Instruments Co.

20

CONTROLS, HYDRAULIC—Pumps, rams, valves, accessories. Features, cross-sectional views. Blackhawk Mfg. Co.

21

CONVEYOR—for bulk materials, called Lo-Veyors. Open and closed pan, tube types, vibrating screens and packers, flexible couplings. Bulletin 35, 8 pages. Ajax Flexible Coupling Co., Inc.

22

CONVEYOR—called the J.C.D.; flexible, portable, reversible motion, variable speed. H. W. Creager Mfg. Co.

23

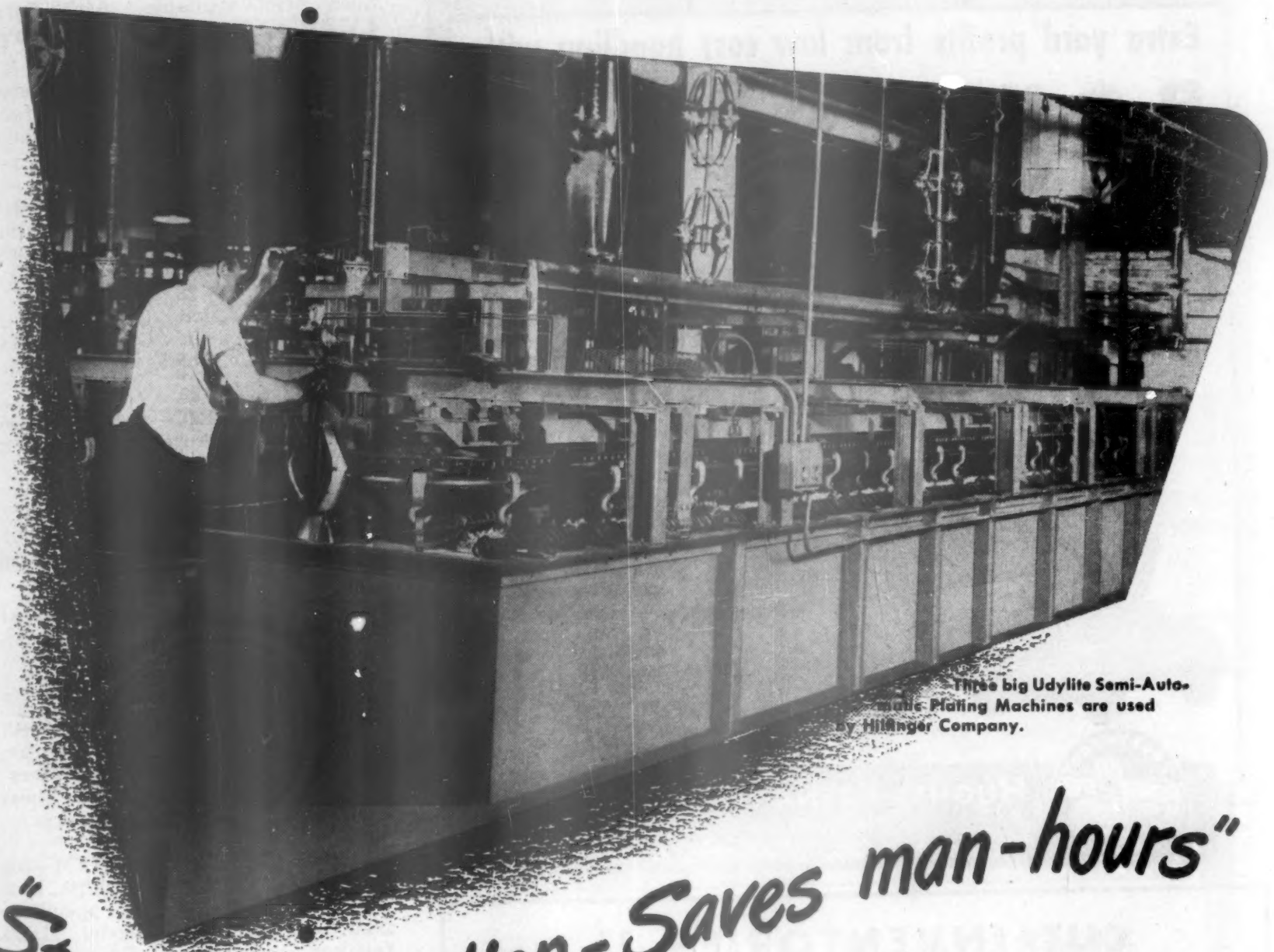
CONVEYOR, SPIRAL—and fittings. Sectional flight, helicoid, mixer, cut flight, ribbon, cast iron types. Selection tables list materials handled by each. The Jeffrey Mfg. Co.

24

CONVEYOR, TROLLEY — 4-page Catalog 551, describes FlexoiD overhead trolley conveyor. Smith Power Transmission Co.

25

CONVEYORS—25(a) Portable, sectional; called Handy-Man; for 6 or 12-in. flat belt set in trough; cleated,



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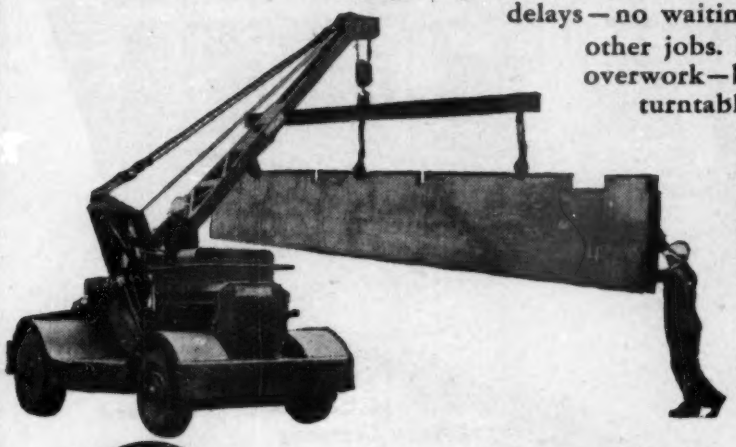

Photo courtesy of Industrial Power Division, International Harvester Company

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flush belts available. **25(b)** Form FV D 1; Flight-Veyor "D." American Conveyor Co.

26

CONVEYOR TABLES—steel, mechanized, for assembly, inspection, packaging. Portable, sectional. Island Equipment Corp.

27

CRANE — Portable shop model, called Sasgen No. 7-C. Photographs show construction, applications. Grand Specialties Co.

28

CRATING — called Craveneer, of wood and paper. Characteristics, types available. Chicago Mill & Lumber Co.

29

DRILL, ELECTRIC—portable ½-in. Construction, features, specifications. Independent Pneumatic Tool Co.

30

DRILL, ELECTRIC — heavy-duty, called Hole-Shooter. Photographs, features. Milwaukee Electric Tool Co.

31

DRILLS, FOR CONCRETE — **31(a)** Catalog Sheet 485 describes combination electric hammer, drill, for drilling concrete, masonry, metal, wood, for driving grinding, buffing, wire wheels. **31(b)** Star drills, with description, drilling depth chart; electric hammer tools and accessories; with prices. Catalog Sheet 486. Wodack Electric Tool Corp.

32

DUST COLLECTING SYSTEM—for rubber and wood dusts, chips, lint. Bulletin A-550; ratings, specifications, description of Model 11B50 Dustkop. Aget-Detroit Co.

33

ELECTRIC PLANTS—20-page Form A-138A, describes plants ranging from 77-lb. 350-watt portable models to 35,000-watt diesel units. Model guide, for selection suggestions. D. W. Onan & Sons, Inc.

34

ELECTRODES, HARD-FACING—Two types, self-hardening 21, and 1027, abrasion resistant, for use on heavy-duty machines. Stoody Co.

35

FANS — Three types of propeller fans, standard and motor-operated automatic shutters, penthouses, guards, with accessories. Catalog 148. Ilg Electric Ventilating Co.

36

FASTENER—called Rivnut, for use either as a rivet or nut plate; 28-page Data Book; sketches, photographs. The B. F. Goodrich Co.

37

FAUCETS—for control of volume and temperature. Features, pictures of three different models; diagram of construction. Cole Valve Co.

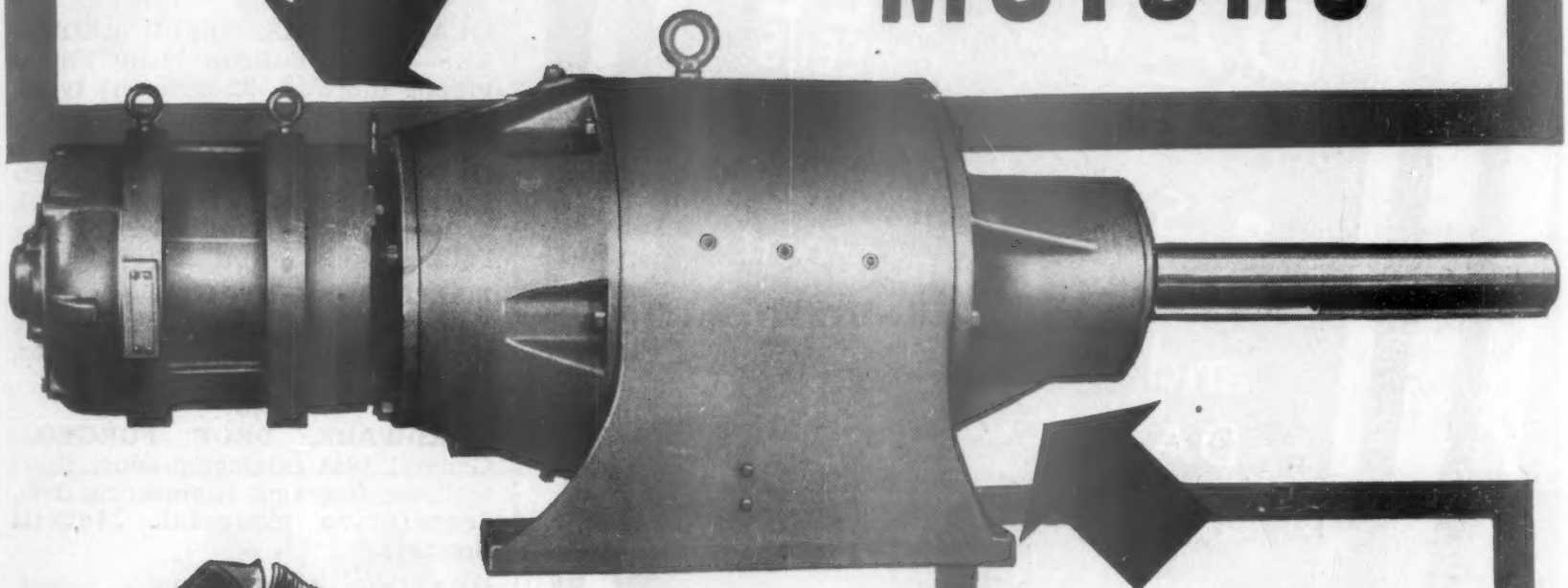
38

FILTERS, DUST—Bulletin No. 98 24 pages, "Industrial Dust Control." Discusses problems involved in dust control. W. W. Sly Mfg. Co.

39

FIRE EXTINGUISHERS — portable and wheeled. Different models

HOWELL *industrial type* MOTORS



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The gear reducer is built by the D. O. James Manufacturing Company, specialists in their field with more than 50 years' experience.

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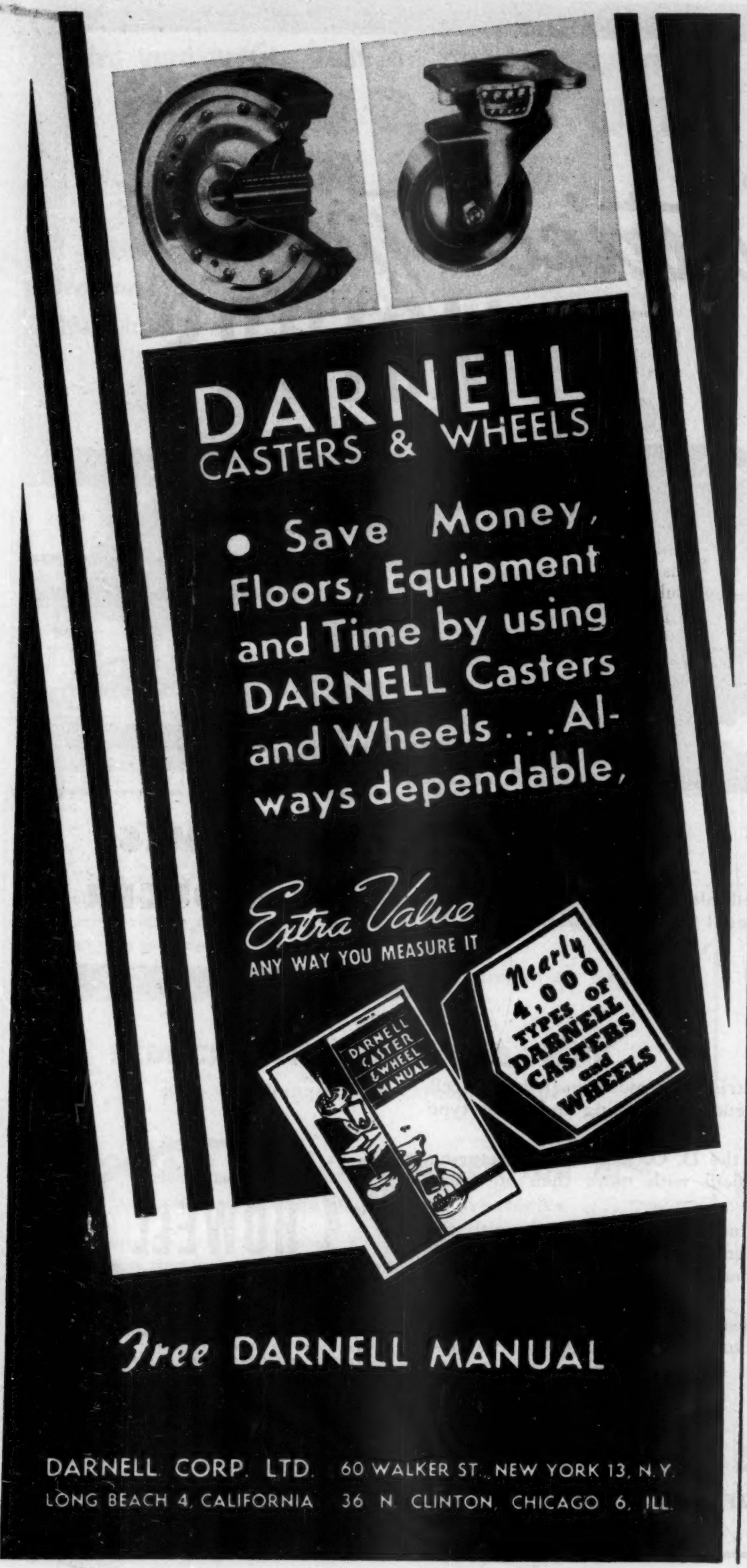
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shown; specifications, dimensions of each. Walter Kidde & Co., Inc.

40

FITTINGS, FLANGES, OUTLETS—welding, threaded, and socket, called WeldOlets; 20-page Catalog and Engineering Reference Book W-2. Bonney Forge & Tool Works.

41

FLOOR RESURFACER—called Ruggedwear, for application over concrete, brick, stone, composition, steel, or wood. Flexrock Co.

42

FRAMING, METAL—for cable, conduit support, shelving, duct and pipe suspension, scaffolding. Called Unistrut. Photographs of installations, types. Unistrut Products Co.

43

GEAR MOTORS, SPEED REDUCERS—8-page Bulletin 10-10. Photographs illustrate 22 different types, in 48 sizes. Janette Mfg. Co.

44

HACKSAW BLADES—called Jet-Edge, high-speed Tungsten steel, shatterproof, unbreakable. Millers Falls Co.

45

RANGERS, SUPPORTS—for pipe, conduit, tubing. Loose-leaf catalog shows different types, specifications, dimensions. The Kindorf Co.

46

HARDWARE, DROP FORGED—General 1948 catalog; product illustrations, diagrams, engineering data, descriptive material. Merrill Brothers.

47

HEATING, INDUCTION — principles, applications, equipment. Case histories of hardening, forging, brazing, annealing. The Ohio Crankshaft Co., Tocco Division.

48

HEATING, RADIANT — "Answers to 50 Questions about Radiant Heating," 8 pages. Definition, advantages, cost; heating surfaces; piping; insulation; concrete floors; coil design; control. A. M. Byers Co.

49

HOSE, METAL FOR COOLANTS—4-page booklet describes, pictures different types. Lengths, sizes, assemblies. Chicago Metal Hose Corp.

50

LIGHTING EQUIPMENT—"Standard Specification for Industrial Lighting Units" discusses porcelain enameled steel. Standards on 14 units. RLM Standards Institute.

51

LIGHTING SYSTEM, FLUORESCENT—"Ceilings Unlimited," 105-page brochure. Continuous wireway systems. The Miller Company.

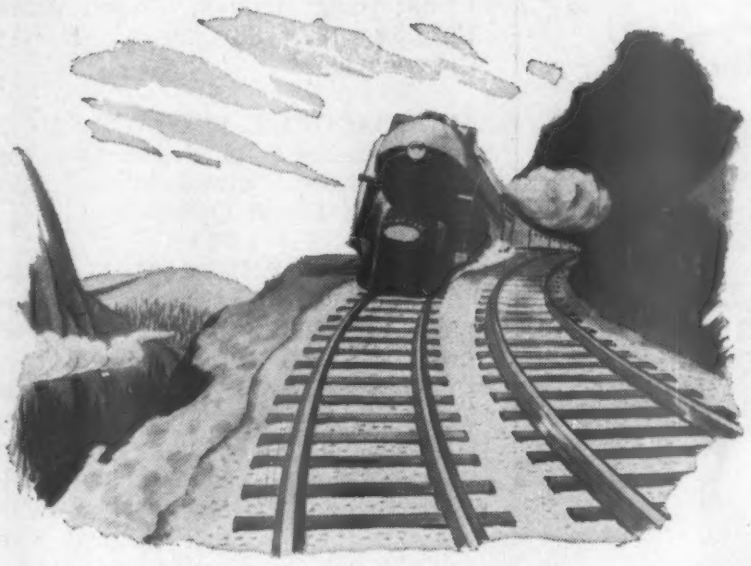
52

MAINTENANCE EQUIPMENT—for commutator, motor, electrical, mechanical maintenance. Also safety, production equipment, metal working saws. General Catalog 27. The Martindale Electric Co.

53

MARKING MACHINES—for variable, informative designations on flat faces of sheets or objects. Dif-

Let Morse grease the rails for *your* tough jobs too!

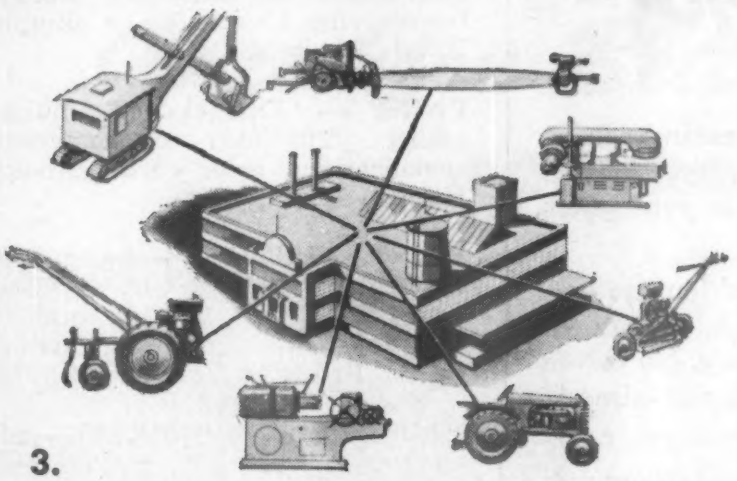


1.

Sc-r-r-ee-ch! Railroad men know this noise means that expensive train wheels and rails are wearing away on curves. To prevent this wear, automatic greasers were installed to lubricate wheels and rails. Old-style ratchet type clutches were tried, but slipped or didn't feed grease right. American Brake Shoe Company's Ramapo Ajax Division solved this knotty problem...

2.

They now use Morse-Formsprag Clutches. The positive action of Morse-Formsprag Clutches is far superior in performance, dependability and service over the old ratchet type. *M-F Clutches engage instantly; allow no back-slip; feed grease to every passing wheel.* Other complex operations on your products may call for Morse-Rockford Friction Clutches...



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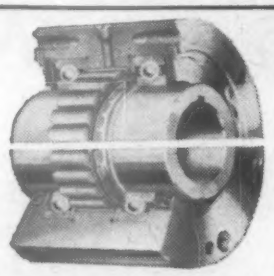
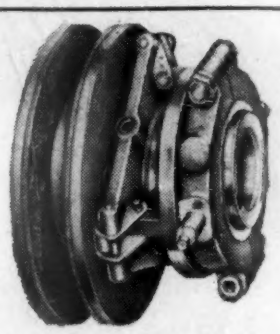
Morse clutches fill almost every need you can imagine. Can the sales and mechanical value of your own products be enhanced by using Morse clutches? Leading manufacturers of such items as construction equipment, cultivators, saws, pumps, lawn mowers and machine tools have bettered *their* products with Morse clutches. How about you? Do this now...



Morse-Formsprag Full Complement Over-Running Clutches



Morse-Rockford Over-Center Small Diameter Clutches

4.

Morse Pullmore Friction Clutches

Write for expert clutch engineering aid and consultation. For new ideas, send for clutch catalogs: Morse Formsprag Clutch Catalog, No. C11-48; Morse Pullmore Clutch Catalog, C31-47; Morse-Rockford Clutch Catalog, SDOC. Address: Morse Chain Company, Department 253, 7601 Central Avenue, Detroit 8, Michigan.

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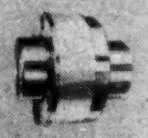

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"How to Fight Fire"

Randolph
LABORATORIES, INC.
4 East Kinzie, Chicago 11, Illinois

ferent types shown, described. Markem Machine Co.

54

MATERIALS HANDLING EQUIPMENT—hand hydraulic, electric lift truck; pallet trucks; others. Junior Catalog 487, 88 pages. Barrett-Cravens Co.

55

MICROSCOPES, WIDE FIELD—20-page Catalog D-15, describes stereoscopic three - dimensional vision. Bausch & Lomb Optical Co.

56

MOTORS, GENERATORS — synchronous. **56(a)** Motors for lumber, pulp, paper industries. Open, drip-proof, splashproof, enclosed, separately ventilated; 4-page GEA-5063. **56(b)** High-speed 900 Series motors, 20 to 1500 hp., at cycle speeds of 1800 r.p.m.; 4-page GEA-5113. **56(c)** High-speed 900 Series generators, 514 to 1800 r.p.m. General Electric Co.

57

MOUNTINGS, VIBRATION—spring, rubber, cork. Installation data, selector chart. Bulletin G-101, 4 pages. The Korfund Co.

58

PADDING, PROTECTIVE — called Tufflex. Description, photographs of applications, types; dimensions. Wood Conversion Co.

59

PALLET UNLOADER—Fork truck attachment for automatic stacking, transferring to storage or shipping. Hauser Machine Co.

60

PAINT — "Enamel - On" finishes, called "Tuf-On." Characteristics, specifications, color card. Brooklyn Varnish Mfg. Co., Inc.

61

PAINT, ALUMINUM—6-page folder, "Take the Guess Out of Maintenance Painting," lists features, applications of aluminum exterior paints. Brooklyn Varnish Mfg. Co.

62

PAINT, FOR CONCRETE—called Oncrete, for marking factory aisles, safety zones. Lowebco.

63

PAINT REMOVER—non-flammable, heavy cream, that needs no washing, neutralizing; 4-page folder. The Savogran Co.

64

PIPE, FITTINGS — Characteristics, features of Karbate pipe and fittings. Sizes, dimensions, assemblies, joining procedures. Catalog Section M-88003. National Carbon Co., Inc.

65

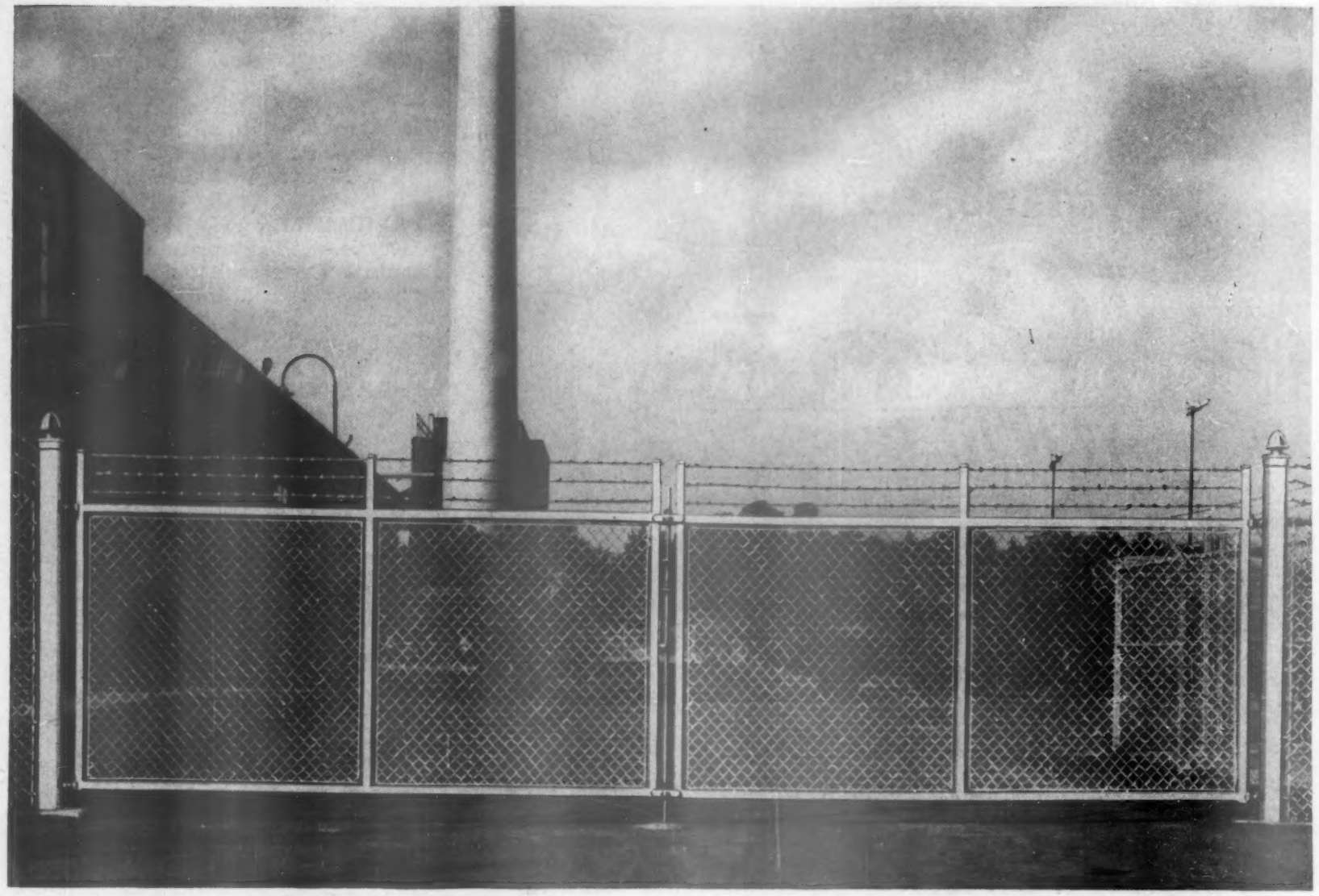
POWER FACTOR — "The Power Factor and What to Do About It," 20-page booklet 200-TEC-1077. Why and how low power factor should be corrected. Electrical Machinery Mfg. Co.

66

POWER TOOLS—portable; saws, drills, sanders, polishers, planes, screwdrivers, wrenches. Mall Tool Co.

67

POTENTIOMETERS — called Elec-



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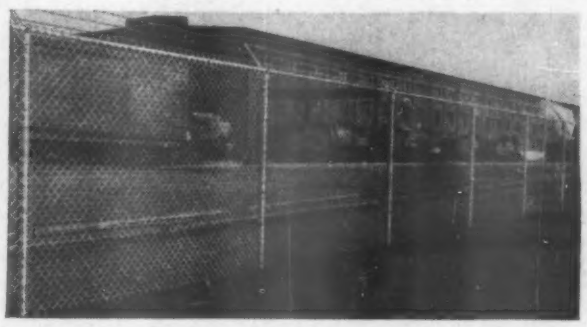
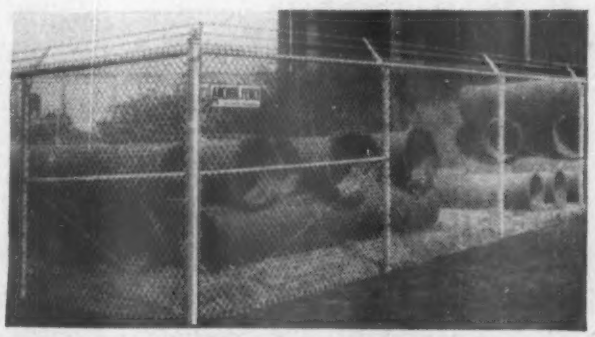


Protects Your Plant Against Snoopers

Installing an Anchor Chain Link Fence at your plant is the best way to shut out trespassers, agitators, all kinds of troublemakers.



Protects Outdoor Storage of Materials & Supplies

Anchor Fence helps you make full use of outdoor space with utmost safety, frees factory space, makes it unnecessary to build at this time.

Anchor Chain Link Fence and Gates are the simple, effective way to get smoother control over all your shipping and receiving operations. Like a traffic cop, an Anchor installation will help you handle the flow of motor traffic and employees in and out of your plant with maximum efficiency. And trained Anchor Fence engineers, experienced in many industrial installations, will install your fence where it will do the most good!

In addition, sturdy Anchor Fence also safeguards outdoor storage of materials and protects your plant against troublemakers. And you'll get extra life and greater protection because of *exclusive* features, like *Deep-Driven Anchors,* which hold the fence erect and in line. *Square Frame Gates,* free from sagging and warping; *Square Terminal Posts* for improved strength, added protection, durability and appearance; *H-Beam Line Posts,* rust-free, rigid and self-draining. Call a trained Anchor Fence engineer now. He'll be glad to discuss your needs, without obligation. Or write for our illustrated folder to: ANCHOR POST FENCE DIVISION, Anchor Post Products, Inc., 6620 Eastern Ave., Baltimore 24, Maryland.

Anchor Fence

Nation-wide Sales and Erecting Service

IS OLD-FASHIONED TACKING SLOWING DOWN YOUR PRODUCTION?

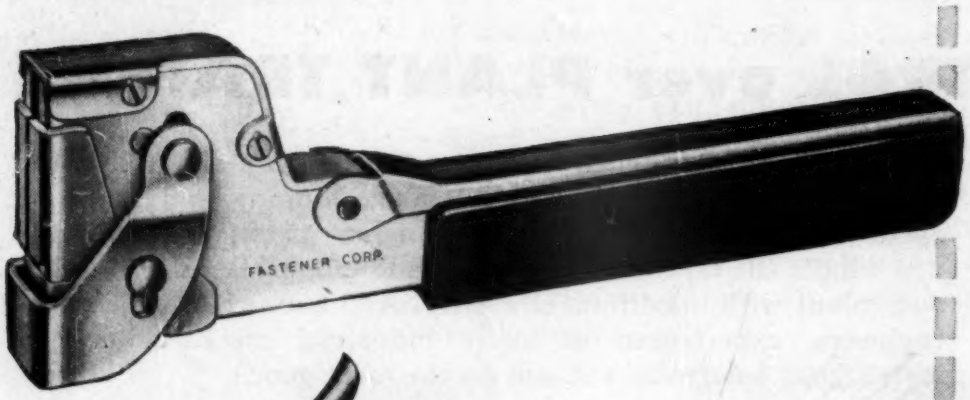
Change to DUO-FAST

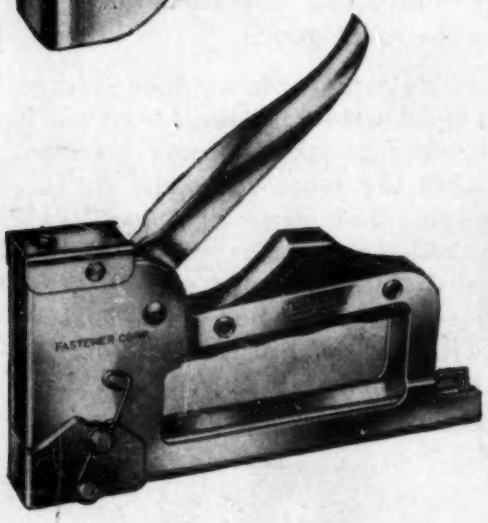
TRADE MARK REG. U.S. PAT. OFF.

AUTOMATIC TACKERS AND WATCH PROFITS GO UP

Eliminate the hammer and nail brigade and bring your production up-to-date and actually ahead of schedule — increase your profits with Duo-Fast tackers. Fast—accurate, these tackers can do a complete job easily with one hand. They're excellent for tacking in awkward places.

There is an automatic Duo-Fast Tacker for every tacking job. All are fully guaranteed as long as genuine Duo-Fast staples are used.





The perfect combination for a job well done — Duo-Fast Gun and Hammer Tacker Team.

Write today for the Duo-Fast catalog on all Duo-Fast automatic tackers.

DUO-FAST

FASTENER CORPORATION

862 Fletcher Street **Chicago, Ill.**

troniK, 31-page Catalog 15-13. Strip chart electric control, strip and circular chart recorders, indicators, controllers, indicating controllers, pyrometric switches, thermocouple and radiamatic assemblies. The Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co.

68

PREHEATER, FOR FUEL OIL—Electric, with automatic temperature control. Cross-sectional view of construction, specifications, ratings, dimensions. Industrial Engineering & Equipment Co.

69

PREHEATER, FOR PAINT—and lacquer, called Viscolator. Explosion proof, for use with spray equipment. Reliable Products Mfg. Co., Inc.

70

PREHEATER, FOR PLASTICS—3-kw., 40-megacycle. Design features, operating data, specifications. General Electric Co.

71

PROTECTIVE COATING—for concrete, called Stontop, to stop "dusting." Six-page folder shows application; other maintenance materials also listed. Stonhard Co.

72

PROTECTIVE COATINGS — cold-applied, to prevent corrosion, deterioration; 12-page folder. Directions for surface preparation, application, coating thickness, coverage, drying time. Tar Products Div., Koppers Co.

73

PULLER, HYDRAULIC—Twin Ram No. 501. Maintenance, operating features; construction, specifications. Livingston Mfg. Co.

74

PULLEYS, CAST IRON—Bulletin P-848, describes entire line. How to order, specifications, weights, prices. Sprout-Waldron & Co.

75

PULLEYS, MAGNETIC—**75(a)** 8-page Catalog C-1001A; electromagnetic pulleys, air-cooled, solid, waterproof, greaseproof, heatproof types. Capacity, dimension tables; photographs of installations. **75(b)** Non-electric Perma-Pulley; design features, operating principles, specifications, capacities, dimensions. Catalog C-1007A, 8 pages. Dings Magnetic Separator Co.

76

PUMPS—**76(a)** 4-page Bulletin 103, describes Monobilt pump, combining pump and motor. Specifications, descriptions, prices. **76(b)** Heavy-duty flexible coupled pumps, special metal pumps, others, in 18-page Bulletin 101. Roy E. Roth Co.

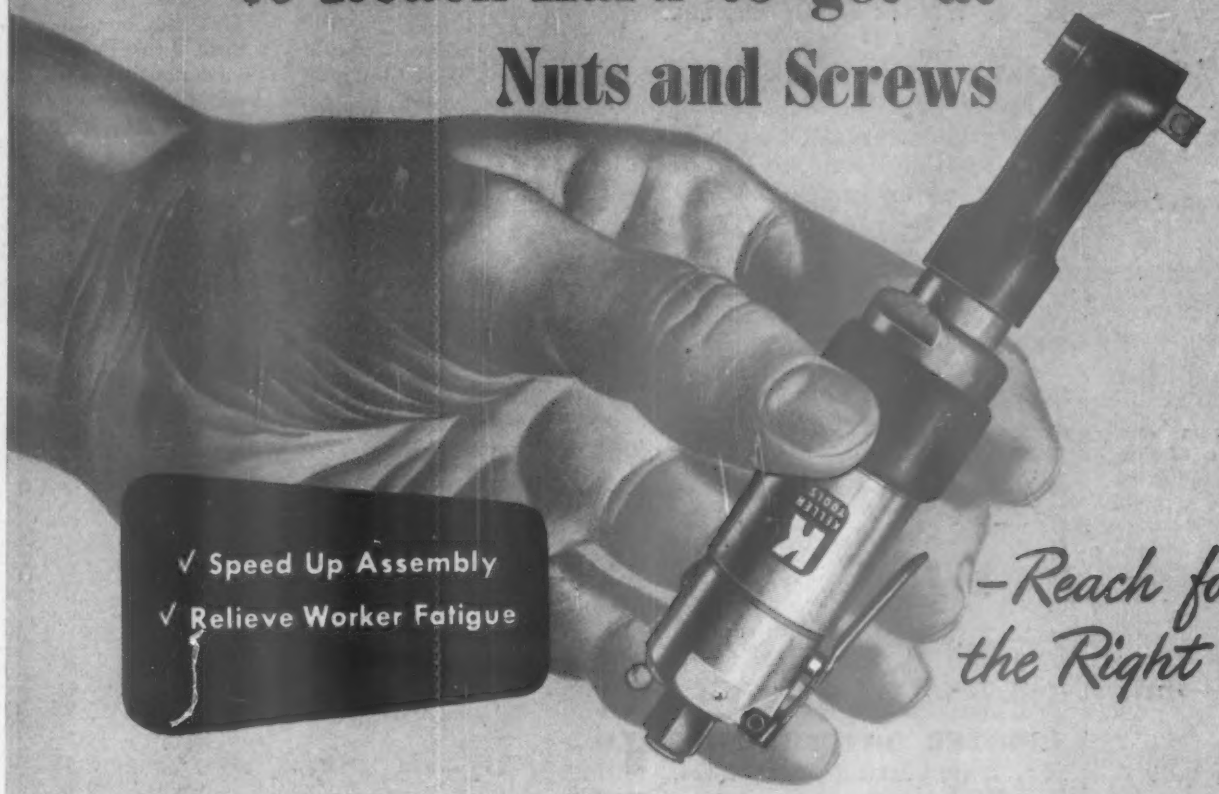
77

PUMPS, FOR LIQUIDS—called Industri-Jet, combines centrifugal pump with jet or ejector. Sizes from ¼ to 5 hp., capacities to 35 g.p.m., pressures to 190 pounds. Goulds Pumps, Inc.

78

RECORDERS; TEMPERATURE, PRESSURE—12-page Catalog 700. Gas-filled recorders, recording pres-

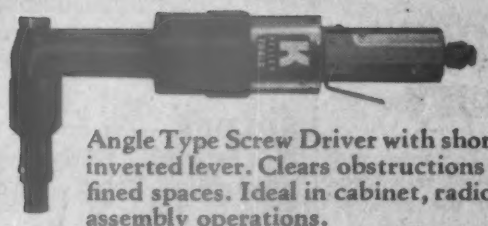
Pneumatic Tools with Noses to Reach Hard-to-get-at Nuts and Screws



✓ Speed Up Assembly
✓ Relieve Worker Fatigue

—Reach for the Right Tool

Keller Right Angle Nut Setter. Favorite for tight spots in automotive, radio, other intricate assembly work. Powerful, steady drive. Double end attachment sets, or removes nuts.



Angle Type Screw Driver with short head, inverted lever. Clears obstructions in confined spaces. Ideal in cabinet, radio, other assembly operations.

Long straight handles on Keller Angle Type Nut Setters make them easy to hold. Convenient operating lever. Quick and easy torque adjustment for any job. Available in a variety of sizes.

Keller Right Angle Nut Setters combine a vertical piston type motor with right angle socket driving attachments. Reach inaccessible spots. Wide selection of attachments.

The 45° angle makes easy nut setting in awkward assembly operations. A lightweight pneumatic tool, packed with power.

Angle Nut Setter with vertical piston type motor and with Pistol Grip Handle. A powerful tool for rugged work.

Extreme Flexibility Wide selection of attachments and varied adjustments adapt Keller Tools quickly to individual jobs. Write for Catalog 12,

KELLER
Pneumatic Tools

KELLER TOOL COMPANY • 4812 MARTIN STREET • GRAND HAVEN, MICHIGAN

Which of these books will be most profitable to you?

HOW TO BECOME A BETTER SUPERVISOR

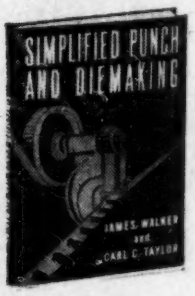
Improved Foremanship

Here is the specific, down-to-earth information that can help you most toward success. In good plain "shop talk" this book tells you exactly how all the different aspects of a production supervisor's work can be handled to best advantage—how, for instance, to train a new worker, settle a grievance problem, win the confidence of a difficult boss, get the best cooperation from other departments, gain the liking and respect of your workers and superiors alike, keep your production up, complaints down. "As readable as a good novel," says one foreman, ". . . and there is hardly a sentence that does not carry an important point"

1000 PRODUCTION AIDS

Illustrated Jig-Tooling Dictionary

988 working drawings, with concise explanations, show you at a glance what you want to know about the design, construction and use of any piece of tooling equipment. Here is a wealth of useful, up-to-date data not only on jigs and fixtures but also on dies, welding, plastic molding, machine tools and allied tools and procedures.



HOW TO GET YOUR GOOD IDEAS INTO PRODUCTION

Simplified Punch & Diemaking

Two expert toolmakers give you the best, most practical information on methods and materials for the design and construction of all types of punches and dies for fabricating sheet metal. One tool and diemaker of 30 years' experience wrote that he found this book so informative and so interesting that he sat up nights reading it! Full reference tables included.

See Them on Approval

The Macmillan Co., 60 Fifth Ave., N.Y. 11

Please send me on 10 days' approval a copy of each of the books checked below.

- ☐ **Improved Foremanship ($3.50)**
- ☐ **Illustrated Jig-Tooling Dictionary ($7.50)**
- ☐ **Simplified Punch & Diemaking ($5.00)**

Signed.....

Address.....

Company..... B

sure gages. Construction illustrated by drawings, photographs. Penn Industrial Instrument Corp.

79

RINGS, RETAINING—called Truarc. Catalog 4K-6 (Part 2); engineering specifications and data on standard type rings; also pliers; 28 pages. Waldes Kohinoor, Inc.

80

ROLLER BEARING UNITS—self-aligning, with Microlock adjustment. Cartridge, flange, take-up, flange-cartridge, and four-bolt pillow block units. Shafer Bearing Corp.

81

RUST PREVENTIVES—called Rust-Oleum. Problems of rust control, directions for use, applications. Rust-Oleum Corp.

82

SAFETY EQUIPMENT—for head and eye protection. 48-page Catalog S-49. Helmets; face pads, shields; goggles; hand shields; safety hats. Dockson Corp.

83

SAWS, POWER—portable; three types of interchangeable cutting heads, attachments, pictured, described. List of saw blades. The Kett Tool Co.

84

SCOOTER, BATTERY-POWERED—for transporting personnel, called the Widgit. Basket attachment for tools, messages, mail, materials. Four-page folder. Beall Mfg. Co.

85

SOLDER—Tri-core rosin-filled or "leak-pruf" acid-filled; solid wire; preforms other products. Alpha Metals, Inc.

86

STARTERS, MAGNETIC—a.c. combination, with circuit breakers. Features, construction, applications. Ward Leonard Electric Co.

87

STEAM EQUIPMENT—Jet blowers and blast nozzles, for moving large volumes of gas at low drafts. Bulletin 4-AB. Schutte & Koerting Co.

88

STEEL—36-page brochure, "What We Produce, How We Produce It, Our Capacity to Serve Industry," tells of facilities of structural steel, steel - weld, industrial equipment. The R. C. Mahon Co.

89

STEEL BARS—cold finished. Low and high carbon shafting quality, screw steels, carburizing steels, in rounds, squares, hexagons, flats, angles. Joseph T. Ryerson & Son.

90

STEEL BUILDINGS—32-page Bulletin B-48, shows types and applications of buildings assembled from standardized, deep-ribbed parts. International Derrick & Equipment Co., Division of Dresser Industries.

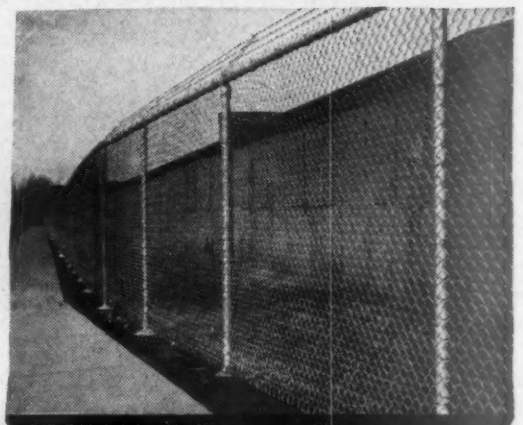
91

STITCHING EQUIPMENT—91(a) "Profit by Stitching," 12-page Catalog AD 15. Photographs, descriptions of machinery for stitching solid fibre and corrugated shipping con-

FOR MAXIMUM PROTECTION

PITTSBURGH CHAIN LINK FENCE

Your property, your equipment, are protected against thieves, meddlers, and the curious when Pittsburgh Chain Link Fence is on the job. Also the coming and going of your own employes is regulated which in itself can save you money both in time and material. We have been planning and erecting good fence for many years—our experts will be glad to give you advice and a cost estimate. Write to Pittsburgh Steel Co., 3251 Grant Building, Pittsburgh 30, Pa.



PITTSBURGH STEEL COMPANY

MATERIALS HANDLING (STANDARDIZED)

LOAD-PACS

Build your own trucks with Load-Pacs (Packaged Running Gear For Trucks)
Save delay . . . save freight . . save maintenance.
LOAD-PACS are shipped as knocked down truck parts.
Capacity up to 5000 lbs.
Anti-friction bearing in all wheels.

Write for bulletins:

1001 Casters · 1002 Running gear · 1003 Floor trucks · 1004 Conveyor · 1005 Lift trucks · 1006 Skids · 1007 Semi skids and jacks · 1009 Special trucks, etc. · 1101 Electric Lift truck.

MARKET FORGE CO.
Materials Handling Div.
30 Garvey St., Everett 49, Mass.

HARDENING COSTS

Slashed 60%

A manufacturer of grass shears in Jackson, Michigan, installed a Westinghouse 10-kw RF Generator, with Westinghouse work-handling equipment, to perform this edge-hardening operation. Results were—

BETTER—50% of the blades required straightening with the previous method; *none* require straightening with the new process.

FASTER—Because of production line handling.

CHEAPER—Cost per blade for this operation dropped from 2½ to 1 cent.

Here's how this up-to-the-minute Westinghouse production tool is used:

1. The loading hopper is filled with a 3-minute supply of blades.
2. A blade is then automatically positioned in the heating coil.
3. The cutting edge is heated to *exactly* the right temperature and *exactly* the right depth.
4. The blade is automatically dropped into the quenching bath at the moment for optimum hardening, and another blade is automatically positioned in the heating coil.

The operation is continuous at a rate of 900 blades an hour, and only one operator is required. The 3-minute hopper capacity affords ample time for the operator to remove a batch from the quenching bath and also refill the hopper before it is completely empty.

What this Westinghouse production tool has done here it can also do for you. A Westinghouse Sales Engineer will be glad to recommend specific equipment for your particular applications. Call your Westinghouse office, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh, Pennsylvania.

J-02120

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

R.F. HEATING

MORE PRODUCTIVE POWER FOR INDUSTRY

MacRae's Blue Book

The Complete Buying Guide for Every Industrial Product — All in ONE BOOK

MacRAE'S BLUE BOOK is handy — efficient — accurate — more accessible — more manageable. Over 75,000 copies are in constant use every day.

56th edition closing. For advertising rates call your agency or write to MacRAE'S BLUE BOOK Co. 18 E. Huron Street, Chicago 11, Ill.

GOOD Food at Noon... BETTER Work all Day!

Balanced, nourishing meals served in the plant speed production . . . build plant morale . . . save time. You'll find industrial cafeterias designed and built by PIX in large plants and small . . . because PIX engineers and craftsmen consistently provide the right plant food service equipment for industry's every need, every budget.

Write for full information. Dept. A

ALBERT PICK CO., INC.

2159 PERSHING ROAD, CHICAGO 9

tainers. **91(b)** Eight-page Catalog AD 76, "Metal Stitching"; complete line of stitching machines. Acme Steel Co.

92

STRAPPING—for cartons, crates, boxes, bales, and heavy-duty strapping for carloads, pallets, skidded shipments. Tools, equipment, accessories; different types of strapping. Brainard Steel Co.

93

STRAPPING MACHINE—for tying wire coils, electrically operated. Photographs of machine in operation. Signode Steel Strapping Co.

94

SUBSTATIONS, LOAD CENTER UNIT—"Planning and Engineering Guidebook for LCS Unit Substations," 20 pages. Dry and liquid-filled transformers, feeder switchgear. Allis-Chalmers Mfg. Co.

95

TAPE, PROTECTIVE—for lead-sheathed cable; corrosion-inhibitive, water repellent. Called No-Ox-Id Wrap. Dearborn Chemical Co.

96

TIMERS—Synchronous motor driven. Models 201 and 202. Features, uses, description and photograph. Dimco-Gray Corp.

97

TOOLS—socket wrench equipment, wrench and hand tool equipment, tool sets, cabinets, power hand tools, miscellaneous. General catalog, 104 pages. Snap-On Tools Corp.

98

TOOLS, SMALL—Micrometers, Vernier calipers, gages, dial indicators, and other machinists' tools, in 28-page catalog. George Scherr Co., Inc.

99

TRANSFORMERS—dry type; 16-page booklet 61X7088. Installation, care, operation. Allis-Chalmers.

100

TRANSFORMERS — compensated type, 5VA capacity, called "Donut." Bulletin 366. Photograph of Model 313, applications, models available. Associated Research, Inc.

101

TRANSFORMERS — substation. 8-page bulletin 61B6014A; construction details, performance features; ratings from 50 to 500 kva. Allis-Chalmers Mfg. Co.

102

TRANSFORMERS—with non-flammable insulating liquid, Chlorextol. Applications, characteristics, ratings. Allis-Chalmers Mfg. Co.

103

TRUCKS, FORK LIFT—"Job Study No. 81," story of materials handling problems and their solution at Landers, Frary & Clark. Towmotor Corp.

104

TRUCK, HIGH-LIFT PALLET—Model M25HP Worksaver. Specifications, operational data and dimensions, capacity, diagramatic drawings. The Yale & Towne Mfg. Co.

105

TUBING, FLEXIBLE METALLIC—**105** (a) Interlocked galvanized steel,

HEAT PROCESSING COSTS REDUCED 75% with GAS VULCANIZING OVENS

Charging one of the five Gas-fired Gehnrich vulcanizing ovens with a truckload of Allison abrasive cutting wheels. Note Bristol recorder and program controller which govern heat processing cycles.

Part of the battery of 21 steam jacketed ovens which were replaced with Gas-fired ovens.

COST REDUCTION is only one of the advantages in the use of GAS for heat processing at The Allison Company, Bridgeport, Connecticut.

In fact, the conversion to modern GAS Vulcanizing Ovens resulted in the following important operating and product advantages, as well as in cost reduction:

- Improvement in the uniformity of the product
- Extension of research facilities to production basis due to accurate heat control
- Elimination of maintenance on steam piping and oven jackets
- Reduction in handling expense

Allison Abrasive Cutting Wheels are high-speed production tools made by bonding sharp abrasive cutting grains in discs with a vulcanized rubber adhesive. In that vulcanizing process GAS performs its vital function—supplies heat at the precise temperature and for the exact length of time required for perfect bonding.

Accurate temperature regulators and simple, time-cycle program controls, have eliminated the human element in the vulcanizing process—have convinced Allison Company executives that GAS, and modern Gas Equipment, really team-up to provide economical, dependable heat processing. Wherever you use heat in production processes there's a place for GAS; your local Gas Company Representative can assist you in applying modern Gas Equipment.

AMERICAN GAS ASSOCIATION
420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

MORE AND MORE...
THE TREND IS TO GAS
FOR ALL INDUSTRIAL HEATING

IS YOUR PLANT LOCATED IN ONE OF THESE STATES?

Idaho	Ohio
Illinois	Oregon
Indiana	Pennsylvania
Iowa	Utah
Michigan	Virginia
Minnesota	Washington
Missouri	West Virginia
Montana	Wisconsin

Leading authorities report that these states will be hardest hit by power shortages this winter, and that not until 1953, if then, will the regular sources of electric power be fully capable of meeting the demand.

How to Maintain Full Production

Five years or more is a long time to be subjected to production slow-ups and work stoppages due to power shortages. *You* can protect your plant against loss of power, by installing your own diesel generating equipment. New York's new International Airport had to insure themselves against power failure, that's why they installed a BFM 150,000 watt, automatic starting diesel generating unit.

Our engineering department will be glad to furnish you with complete information, at no obligation, on a standby or continuous duty diesel generating set for your plant.

When writing in, don't forget to ask for our new 32 page booklet containing complete specifications covering every commercially manufactured diesel engine. Copies are available at no charge to plant operating men and purchasing agents.

BFM BENJAMIN'S for MOTORS
2200 Mill Ave.
Brooklyn, N. Y.

bronze steam hose, 12-page Bulletin 52-9, 948. **105 (b)** Six-page folder, "Penflex Flexineering"; information on applications of flexible tubing for air, oil, steam, gases, and volatiles. Drawings, photographs. Pennsylvania Flexible Metallic Tubing Co.

106

VALVES — Line called Renewo Threesome; regular, with nickel alloy seat and disk, plug "P", nickel alloy 330 Brinel seat and disk; Plug "PS", stainless steel 500 Brinell seat and disk. The Lunkenheimer Co.

107

VALVES, LUBRICATED PLUG—4-page Section 5 of Reference Book 39; "Self-Seald" lubricated plug valves. Homestead Valve Mfg. Co.

108

VALVES, STRAIGHT-THROUGH—self-closing automatic, for air, water hose; for machines; continuous blow-down valves, and others. Paul Valve Corp.

109

VALVES, TEMPERATURE CONTROL—Automatic Series CR McKee, for air-controlled combustion systems. Solenoid-operated, steam, thermostatic types. Eclipse Fuel Engineering Co.

110

VAPORIZER—for insecticides, deodorants, produces fog which penetrates into inaccessible spots. Electrically powered, called Microsol #202. The Hession Microsol Corp., Div. of Silver Creek Precision Corp.

111

WATERPROOFING — "Specification for Dry Walls," 4-page folder; describes processes using Parge for interior surfaces, Dilato for exterior joints. Western Waterproofing Co.

112

WATER TREATMENT — "Hypo-Chlorination of Water." Use of calcium hypochlorite in the control of algae tastes and odors. Mathieson Chemical Corp.

113

WELDING, CUTTING EQUIPMENT—40-page Form 20B, catalogs gas welding, flame cutting tools: torches; cutting attachments, tips; cylinder manifolds, trucks; regulators. Victor Equipment Co.

114

WELDERS — automatic flash and butt, for welding saw blades, tubes, rods. Pedestal and table models. The DoAll Co.

115

WIRES, CABLES — Armored cables, service entrance cables, non-metallic sheathed cables, and latex-insulated building wire; 20-page catalog. U. S. Rubber Co.

116

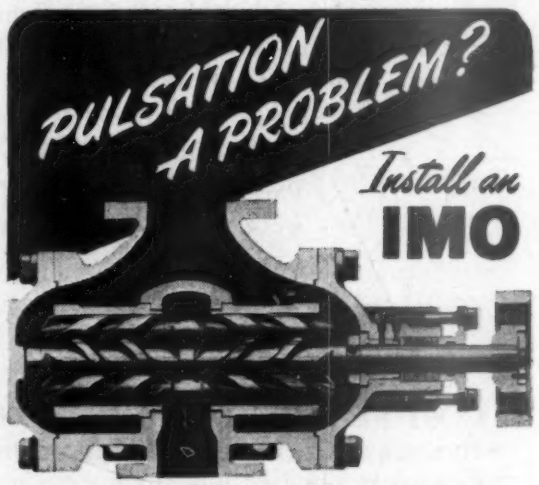
WIRE MESH PRODUCTS—and collapsible folding gates. **116 (a)** Eight-page Catalog 12; wire mesh enclosure panels, window guards; roller bearing collapsible folding gates. **116 (b)** Catalog 49, 12 pages; woven wire partitions, panels, windows, doors, roller bearing collapsible folding gates. Acorn Wire & Iron Works.

'Week-end reservations for me... AND MY WATCHMAN!"

Fantastic!
You don't take along your Watchman on your week-end engagements.
He is PAID to protect your plant.
But does he? You will never know until he is mechanically supervised by a DETEX GUARDSMAN Watchclock.
The GUARDSMAN runs on continuous tape. There is no need for an executive to return to the plant to change the clock dial during long week-ends or plant shutdowns.
If you can AFFORD Fire, Theft or Malicious Damage, then you can afford to forget about DETEX. Otherwise, write for full details.

DETEX
WATCHMENS CLOCKS
PATROL
ALERT
ECO
NEWMAN
GUARDSMAN
DETEX WATCHCLOCK CORPORATION
Dept. FM-12
76 VARICK STREET, NEW YORK 13, N.Y.
Sales and Service in All Principal Cities

PULSATION A PROBLEM?
Install an IMO



With an IMO Pump delivery is not interrupted by the periodic strokes of a piston or the opening and closing of valves and ports. The turning of the rotors in an IMO forces the fluid from suction to discharge in a continuous, uniform flow.
IMO pumps can be furnished for practically any capacity and pressure required for oil, hydraulic-control fluids, other liquids.
Send for Bulletin I-145 J

IMO PUMP DIVISION of the
DE LAVAL STEAM TURBINE CO.
TRENTON 2 NEW JERSEY

One of a series *of messages to help you increase your understanding of business paper advertising, and its effect on your business.*

Where are next year's profits coming from?

LABOR COSTS probably won't be any lower. Most materials, when you can get them, will still be costly. Yet no one in his right mind believes that profits can come from higher and higher prices. For that just makes *everybody* the loser in the end.

So the answer you hear most often is for all of us to *produce* more. To produce more efficiently. To so refine our mass production techniques that we can shave the last penny off the manufacturing cost per unit.

But that's not the *whole answer!*

The same principle must be applied to the *manufacture of a sale.* Because that's where business will find its best opportunities for profit — now and in the years to come.

With a buyers' market already in sight, it is time for business to re-examine the whole process of selling and distribution, and to improve the techniques of marketing its goods and services. The job is a tough one. It calls for streamlining, for more *mechanization* —which is simply another name for more aggressive and efficient advertising.

Skillfully employed, advertising is to selling what the assembly line is to production. It is a machine that increases the capacity of the sales force by the hundreds, or thousands, or by any quantity your market requires—exploring the field, arousing interest, creating a preference for your company and its products.

And nowhere does this machine operate at *higher efficiency* than in the business press, where it is concentrated among your best prospects—and no one else!

What are the ten ways to measure the results of your business paper advertising? You'll find the answers in a recent ABP folder, which we'll be glad to send you on request. Also, if you'd like reprints of this advertisement (or the entire series) to show to others in your organization, you may have them for the asking.

Factory Management and Maintenance

is one of the 129 members of The Associated Business Papers, whose chief purpose is to maintain the highest standards of editorial helpfulness—for the benefit of reader and advertiser alike.

"HOLY MOSES . . .

there's something I never knew before!"

F-11

Unless you're exceptionally well-informed there are probably lots of things YOU never knew before right here in the advertising pages of this magazine.

Alert manufacturers use these advertising pages to get the *news* about their products and services to you . . . quickly and effectively.

Their advertisements contain information designed to help *you* do your job better, quicker and cheaper.

To be well-informed about the latest developments in *your* industry . . . and to stay well-informed . . . *read all the ads too.*

HEADQUARTERS FOR INDUSTRIAL INFORMATION

McGRAW-HILL PUBLICATIONS

SAVE

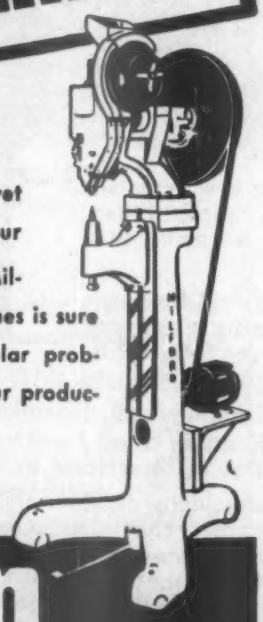
- MATERIALS
- MAN-HOURS
- MONEY

with the . . .

RIGHT RIVETS

Select exactly the right semi-tubular, split rivet, or cold-headed fastener from Milford's complete line. You'll find it pays in every way!

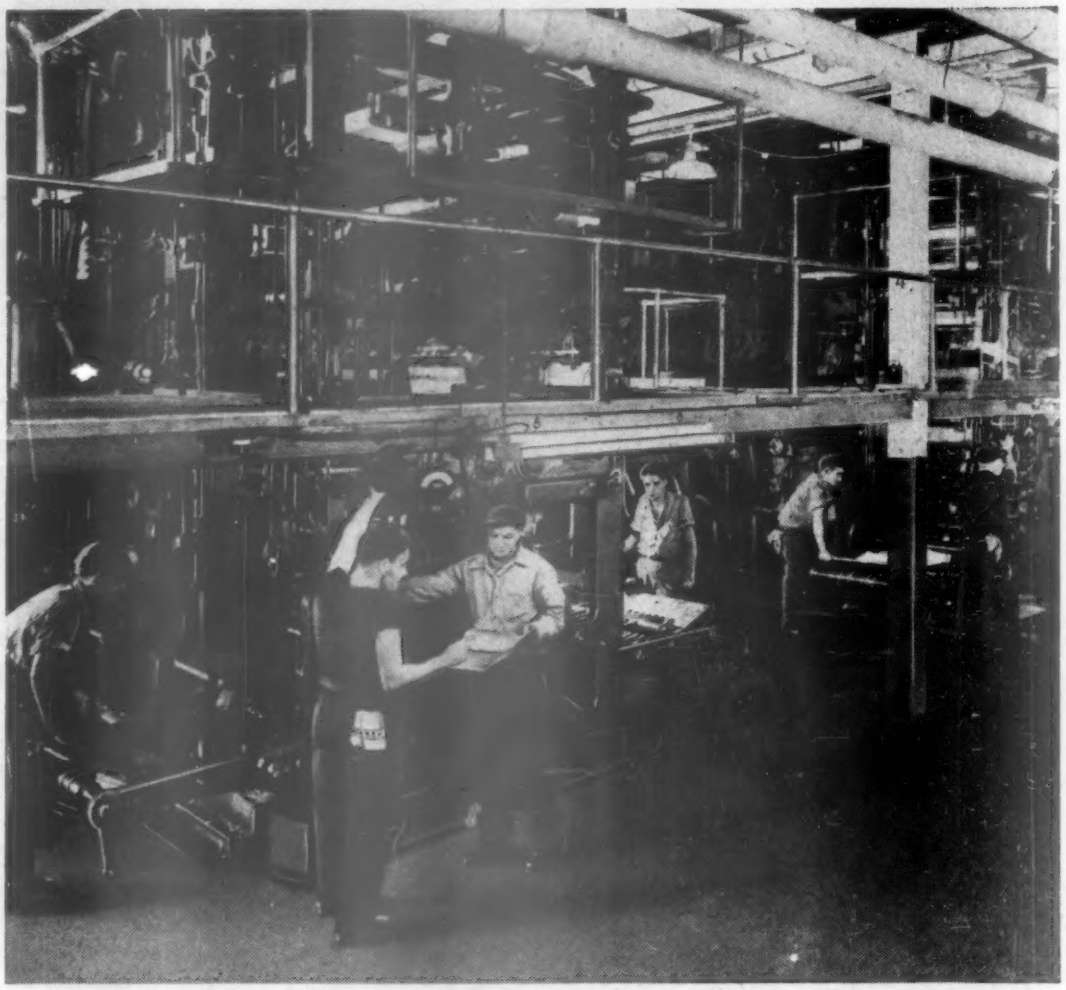
RIGHT MACHINE



Then use the right rivet setting machine for your application. One of Milford's 15 basic machines is sure to solve your particular problem . . . and slash your production costs!

PENN RIVET & MACHINE COMPANY
254 Huntingdon Street
PHILADELPHIA 33, PENN.

"KEX" *Industrial Wiping* TOWELS



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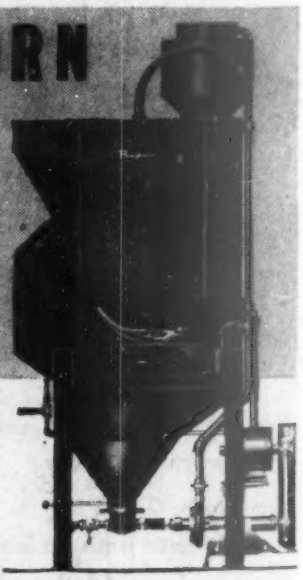

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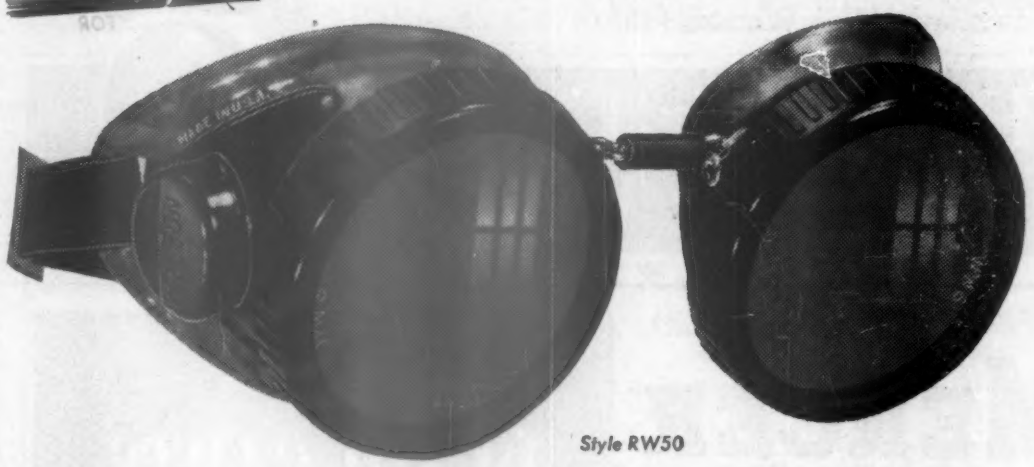

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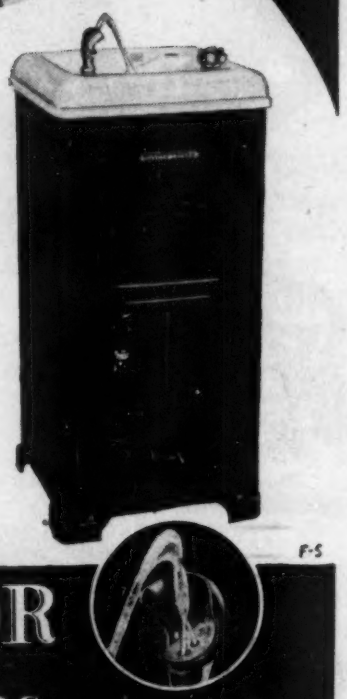

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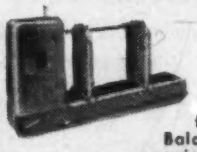

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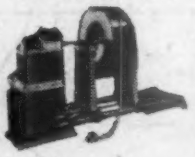

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(Continued on page 294)

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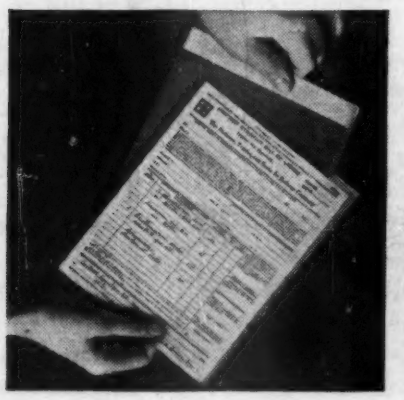

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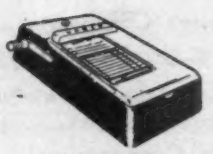

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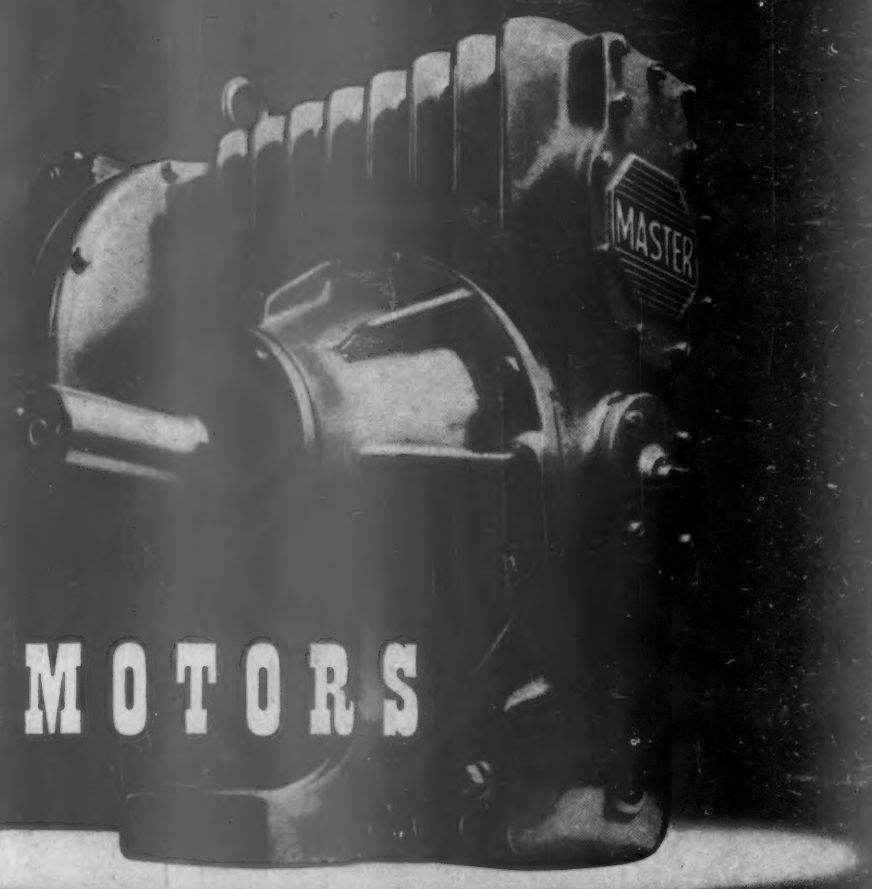

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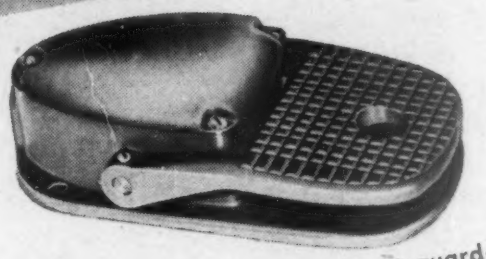

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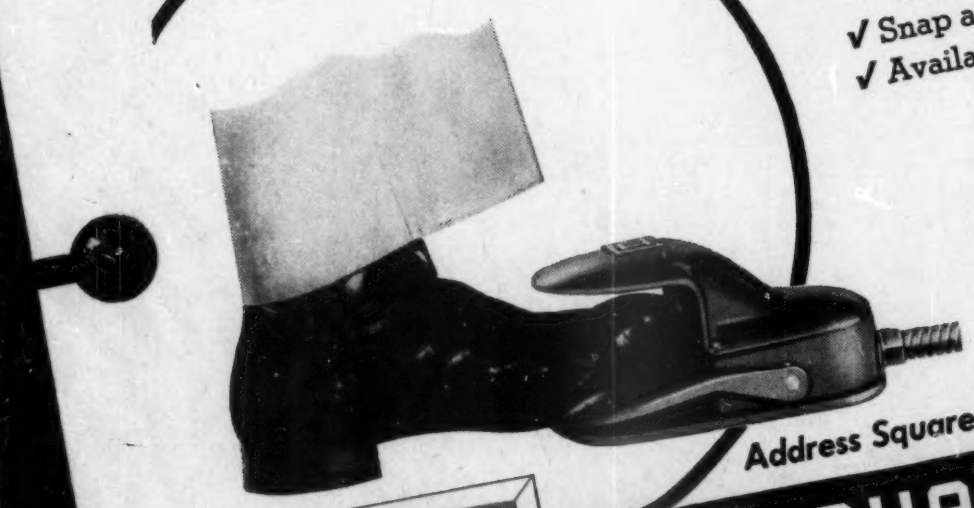

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